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SOFTWARE MAINTENANCE OF THE SUBWAY ENVIRONMENT SIMULATION COMPUTER PROGRAM

PARSONS BRINCKERHOFF QUADE & DOUGLAS, INC.
One Penn Plaza
250 West 34th Street
New York NY 10001

DECEMBER 1980
FINAL REPORT

DOCUMENT IS AVAILABLE TO THE PUBLIC THROUGH THE NATIONAL TECHNICAL INFORMATION SERVICE, SPRINGFIELD, VIRGINIA 22161

Prepared for

U.S. DEPARTMENT OF TRANSPORTATION
URBAN MASS TRANSPORTATION ADMINISTRATION
Office of Technology Development and Deployment
Washington DC 20590

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16. Abstract

This document summarizes the software maintenance activities performed to support the Subway Environment Simulation (SES) Computer Program.

The Subway Environmental Design Handbook (NTIS No. PB-254-789) was developed as a guide and reference for the planning, design, construction and operation of environmental control systems for underground rapid transit. The SES computer program was developed for use in conjunction with the Handbook as a designer-oriented tool to provide estimates of the air flow, temperature, and hunidity characteristics, as well as air conditioning requirements, for both operating and proposed multiple-track subway systems of any given design and operating characteristics.

The report summarizes the activities of the project and contains the procedural guidelines, and revisions to the SES Computer Program, User's Manual and Programmer's Manual (NTIS No. PB-254-790) which were issued during this contract.

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15. Supplementary Notes The Subway Environmental Design Handbook, Volume I: Principles and Applications (PB 254-788); Volume II: Subway Environmental Simulation (SES) Computer Program, Part 1: User's Manual (PB 254-789); and Volume II: Subway Environmental Simulation (SES) Computer Program, Part 2: Programmer's Manual (PB 254-790). Set of three volumes: PB 254-787.

16. Abstract

This document summarizes the software maintenance activities performed to support the Subway Environment Simulation (SES) Computer Program. The SES computer program is a design-oriented analytic tool developed during a recent five-year research project focusing on methods for environmental control in underground rapid transit systems. As discussed in The Subway Environmental Design Handbook, computer simulation was used to overcome the deficiencies of closed-form mathematical modeling, and was validated using scale models and field-testing. The Handbook was developed as a guide and reference for the planning, design, construction, and operation of environmental control systems for underground rapid transit. Shortly after the publication of the Handbook, SES was released to the rail transit community for the purpose of reducing the environmental problems of existing systems, and to help plan facilities and establish standard procedures for improved environmental control in new systems. This report is published in order to aid users of the program in realizing these goals. Software maintenance, as outlined in this report, will help update and correct the program. The SES computer program was developed for use in conjunction with the Handbook to provide estimates of the air flow, temperature, and humidity characteristics, as well as air conditioning requirements, for both operating and proposed multiple-track subway systems of any given design and operating characteristics. This report contains a chronological history of the SES project, a profile of the typical SES user, and a list of present users. The appendices contain the documents distributed to SES users during this project: "Software Maintenance Procedural Guidelines"; "SES Computer Program Revisions"; and "SES User's Manual and Programmer's Manual Revisions".

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PREFACE

The Subway Environment Simulation (SES) Computer Program is a design-oriented analytic tool developed during a recent five-year research project focusing on methods for environmental control in underground rapid transit systems. As discussed in the comprehensive Subway Environmental Design Handbook (NTIS No. PB 254 788), which documents that effort, computer simulation was used to overcome the deficiencies of closed-form mathematical modeling, and was validated using scale models and field-testing. Shortly after the publication of the Handbook, SES was released to the rail transit community for the purpose of reducing the environmental problems of existing systems, and to help plan facilities and establish standard procedures for improved environmental control in new systems. This report is published in order to aid users of the program in realizing these goals; "Software maintenance," as outlined in this volume, will help update and correct the program.

The publication of this report marks the end of the second phase of the Subway Environmental Research Project, conducted from the U.S. Department of Transportation's Transportation Systems Center (TSC) under sponsorship by the Urban Mass Transportation Administration's Urban Rail Construction Technology Program. In addition to coordinating the software maintenance, TSC has directed modification of SES for enhanced use by the Research and Special Program Administration. Software maintenance activities for this task, however, are not included in this volume, but will instead be incorporated in SES Version 3 appearing at a later date.

METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
in	inches	2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
		AREA		
in^2	square inches	6.5	square centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.8	square meters	m^2
mi^2	square miles	2.6	square kilometers	km^2
	acres	0.4	hectares	ha
		MASS (weight)		
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
		VOLUME		
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft^3	cubic feet	0.03	cubic meters	m^3
yd^3	cubic yards	0.76	cubic meters	m^3
		TEMPERATURE (exact)		
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
		AREA		
cm^2	square centimeters	0.16	square inches	in^2
m^2	square meters	1.2	square yards	yd^2
km^2	square kilometers	0.4	square miles	mi^2
ha	hectares (10,000 m^2)	2.5	acres	
		MASS (weight)		
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
		VOLUME		
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m^3	cubic meters	35	cubic feet	ft^3
m^3	cubic meters	1.3	cubic yards	yd^3
		TEMPERATURE (exact)		
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F

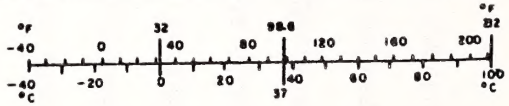

TABLE OF CONTENTS

1. PURPOSE 1

2. PROJECT OBJECTIVES 1

3. PROJECT HISTORY 2

4. SES USERS 11

APPENDIX

A SOFTWARE MAINTENANCE PROCEDURAL GUIDELINES A-1

B USER'S AND PROGRAMMER'S MANUAL REVISIONS B-1

C SOURCE CODE REVISIONS C-1

D REPORT OF NEW TECHNOLOGY D-1

1. PURPOSE

This report summarizes the activites performed under Contract DOT-TSC-1216, "Software Maintenance of the Subway Environment Simulation Computer Program." It contains a chronological history of the project, a profile of the typical SES user, and a list of present users. The appendixes contain the documents distributed to SES users during this project:

SOFTWARE MAINTENANCE PROCEDURAL GUIDELINES

SES COMPUTER PROGRAM REVISIONS

SES USER'S MANUAL AND PROGRAMMER'S MANUAL REVISIONS

2. PROJECT OBJECTIVES

The Subway Environment Simulation (SES) Computer Program, complete with user and programmer documentation, was an end product of the Subway Environment Research Project (SERP) sponsored by the Urban Mass Tranportation Administration (UMTA). The major objective of the SERP was to develop an ability to control and to predict such factors as air temperature, velocity, and humidity in the subway environment. An important result of the project has been the development of the SES Computer Program, an analytical tool which allows the environmental design engineer to calculate flows of air and heat in a complex subway network with vent shafts, stations, stairwells, multiple trains, etc.

The SES software maintenance project was designed to give technical assistance to SES users who encountered problems with either the software or documentation. A procedure was established whereby potential problems could be reported. If the existence of a problem was verified, a correction was issued to all registered users in the form of a software modification or documentation revision.

This service was provided to SES program users in an effort to foster the use of improved subway design techniques and for the benefit of the transit-using public.

3. PROJECT HISTORY

Contract Item 1 - Program Plan

July 1976

Development of the Procedural Guidelines which state the procedures required to document, to direct maintenance work, and to advise SES users of program modifications and updates was completed.

August 1976

The Procedural Guidelines were sent to all known users of SES Version 2, thus completing this contract item. (See Appendix A for the text of the Procedural Guidelines.)

Contract Item 2 - Maintenance Activities

Throughout the term of this contract, assistance was provided in the form of answering questions posed by SES users and potential users. These questions generally fall into the following categories:

Potential Users	-	Questions concerning the types of problems solved by SES, and ways to obtain the program and documentation.
New Users	-	Questions on making SES operational on their computer and preparation of input data.
Established Users	-	Questions on the effects that modeling decisions have on results, and questions on identification of problems in the SES program and problems in the input data.

During this contract 14 revisions to the SES User's Manual and one revision to the SES Programmer's Manual were issued. Appendix B contains the complete text of these revisions.

Fourteen modifications to the SES source code were also issued during the contract. A summary of these revisions is presented in Table 1, and the entire text of the modifications is presented in Appendix C.

July 1976

Four SES problems were discovered. After TSC approval was given to work on them, they were rectified. A package fully describing the revisions and their background was transmitted to the known users of SES Version 2. The program with these changes was designated SES Version 2.04 (SES Version 2, Modification Level 4). The four problems were

1) The rate of train power loss was computed incorrectly when a train was coasting downhill (Problem Category 1).

2) The average value for relative humidity was output incorrectly for subsegments other than the first subsegment in each line segment or ventilation shaft (Problem Category 1).

3) Under certain, rather complicated, circumstances, a floating point division by zero occurred in Subroutine TRAIN (Problem Category 2).

4) A FORTRAN variable was not properly initialized in Subroutine VSINS (Problem Category 1).

TABLE 1 SES SOURCE CODE MODIFICATIONS

Modification Number	Date	Routines Modified	Description
1	7/23/76	HEAT	Correct the computation of train power loss when coasting downhill.
2	7/23/76	SUMARY	Correct the computation of average relative humidity.
3	7/23/76	TRAIN	Correct runaway trains caused by incorrect computation of braking rate.
4	7/23/76	VSINS INPUT	Correct the initialization of variables.
5	11/18/76	ACEST2	Correct supplementary output.
6	11/18/76	INPUT	Correct title page.
7	11/18/76	DSES	Correct program reponse following fatal input error.
8	1/21/77	OMEGA2 INPUT	Correct calculation of air pressure change in a segment containing a train.
			Provide revised SAMPL5 output.
9	4/14/77	TRAIN LOCATE INPUT	Correct runaway trains caused by precision problem in computations.
10	8/12/77	GARAGE	Correct acceptable input range for Front of Train Drag Coefficient.
11	8/12/77	TRINS	Improve processing of erroneous input data.
12	8/12/77	LOCATE	Correct computation of train drag under certain circumstances.
13	8/12/77	VSINS	Correct time of fan activation.
14	8/12/77	ERROR INPUT	Revise severity category of two input errors.
-	1/24/78		Provide revised output for SAMPL5 test problem.

November 1976

Three SES problems were discovered. After TSC verbal approval was given, they were rectified. The program with these changes was designated SES Version 2.07 (SES Version 2, Modification Level 7). The three problems were:

1) Items to be printed as part of the optional supplementary output for the environmental control estimate did not print correctly (Problem Category 1).

2) A superannuated title appeared in the output. The program title was changed to indicate the program being under the sponsorship of the TSC (Problem Category 1).

3) The program response following the diagnosis of a fatal error in an input data set was occasionally wrong, causing the printing of erroneous input verification (Problem Category 1).

Thirteen minor problems were discovered and rectified in the SES User's Manual. These problems were eigher typographical errors or instructions that could be misunderstood.

One problem was discovered and rectified in the SES Programmer's Manual. Certain instructions for computing program array sizes had not been updated from SES Version 1 to SES Version 2.

A package fully describing the above revisions and their background was transmitted to the known users of SES Version 2. In addition, a complete, up-to-date tape of SES Version 2.07 was supplied to the TSC.

December 1976

A problem in the SES aerodynamic subprogram was discovered. Subroutine OMEGA2 did not always correctly calculate the aerodynamic forcing function for the last region in the last line segment of a line section. The problem became apparent when the SES program computed infinite airflows from its first integration step, which for the problem under consideration was at simulation time equal to 0.1 seconds. The problem was traced by adding FORTRAN WRITE statements to key locations in the program. The problem was fixed by changing the order and numbering of five FORTRAN statements in Subroutine OMEGA2 (Problem Category 2).

January 1976

An update describing a correction to subroutine OMEGA2 of the SES aerodynamic subprogram was mailed to all known users of SES Version 2. The program problem was that the air pressure change in the line segment, which contributes to both the airflows and the train drag, was sometimes being computed incorrectly. The error occurred in line segments that were in line sections having more than one line segment. It did not occur in the first line segment of a line section. The problem could occur for a line segment only if trains were in its line section. For these possibilities, the problem consisted of the previous

value for the change in air pressure over the end of a train being added at the end of a line segment when a zero value should have been added.

This change updated SES to Version 2.08 (Version 2, Modification level 8).

April 1977

A problem was corrected in the SES train performance subprogram which monitors and controls the passage of a subway train through the system. A copy of the data set that uncovered the problem was obtained from the user (Kaiser Engineers) and was tested on PBQ&D's IBM 370/135. This simulation showed that for a rare situation, the train performance subroutines could not properly monitor the location of a train, and therefore, could not control it. The problem was traced to the precision with which Subroutine TRAIN computes the distance the train has traveled in a single program time-step, and the strategy that Subroutine LOCATE used to locate the trains with respect to the track sections, etc. This problem was eliminated by minor changes to Subroutines TRAIN and LOCATE (Problem Category 3).

A package fully describing the above problem and its corrections was transmitted to the known users of SES Version 2. In addition, a complete, up-to-date tape of SES Version 2.09 was supplied to the TSC.

August 1977

The following minor problems in the SES Program were discovered and corrected

1) The checking of the input parameter, "Front of Train Drag Coefficient", was being done with a set of limits that were inconsistent with those in the User's Manual (Subroutine GARAGE) (Problem Category 1).

2) If an incorrect value was entered for the deep sink temperature, the program interpreted it as a fatal error. It should have been a non-fatal error (Subroutine ERROR) (Problem Category 1).

3) If a train was operating above grade, its drag coefficient had one value when any subway system was being simulated and another when only above-grade operations were being simulated. The error was minor, being about 8 percent for a typical train (Subroutine LOCATE) (Problem Category 1).

4) The input of a non-existent train type into the track section data (Input Forms 8) was supposed to be a fatal error with an immediate halt to the processing of the input data. This halt did not always occur (Subroutine TRINS) (Problem Category 1).

5) If a train route was input as passing through a certain line section and in fact it could not pass through this line section, the wrong section input was not written out. In addition, this error should have been a fatal error instead of a non-fatal error (Subroutine TRINS) (Problem Category 1).

6) The internal use of the "Fan Time On" parameter (time at which a fan is turned on) in the program was such that when a fan was defined as being fully operational at the beginning of simulation, there was an unnecessary opportunity for the solution of the aerodynamic equations to be unstable. This may have caused the use of a smaller than necessary time increment for the aerodynamic integration (Subroutine VSINS) (Problem Category 1).

The write-up describing the use of both the "Fan Time On" and the "Fan Time Off" input parameters in the User's Manual was added to and improved upon. This write-up constituted revision number 14 to the SES User's Manual (Problem Category 2).

A package fully describing the above revisions and their background was transmitted to the known users of SES Version 2. In addition, a complete, up-to-date tape of SES Version 2.14 was supplied to the TSC.

April 1977

The contract completion date was extended to August 31, 1978.

August 1978

The contract completion date was extended to October 6, 1978.

4. SES USERS

As of October 6, 1978 the following organizations had obtained a copy of the SES source code:

Organization	Use*
Parsons Brinckerhoff Quade & Douglas, Inc.	Heavy
Kaiser Engineers	Heavy
Deleuw Cather	Heavy
Jet Propulsion Laboratory	Medium
Kotu Kikai Setubi Sekke Jimusho Ltd. (Japanese Consultant)	Medium
Washington Metropolitan Area Transit Authority	Medium
C.E. Maguire, Inc.	Medium
The City of Philadelphia	Light
The Port Authority of New York and New Jersey	Light
Consorcio Nacional de Engenheiros Consultores (Brazil)	Light
Sverdrup and Parcel and Associates	Light
Transportation Systems Center	Light
New York City Transit Authority	Light
Bechtel, Inc.	Light
Montreal Urban Community Transit Commission	Light
Snowy Mountains Engineering Corporation (Australia)	Light

* "Heavy" users have completed two or more projects, and have two or more underway; "Medium" users have completed one project, and have at least one underway; and "Light" users are beginning their first application.

APPENDIX A

SOFTWARE MAINTENANCE PROCEDURAL GUIDELINES

(Revised December 2, 1977)

These procedural guidelines were sent to SES users to inform them of the existence of the maintenance project and the procedure for reporting problems and obtaining technical assistance. The User Registration Form was used to obtain information on the SES Users.

TABLE OF CONTENTS

Section		Page
I.	OJBECTIVE	A-3
II.	LIMITATIONS	A-3
III.	REGISTRATION	A-4
IV.	SES REVISIONS	A-5
V.	USER'S RESPONSIBILITY	A-6
VI.	REQUIREMENTS TO RECEIVE ASSISTANCE	A-7
VII.	PROBLEM REPORTING PROCEDURE	A-9
VIII.	RECORDKEEPING	A-10

Subway Environment Simulation (SES) Computer Program

Software Maintenance Procedural Guidelines

I. OBJECTIVE

The Subway Environment Simulation (SES) Software Maintenance Plan is designed to give assistance to SES program users who encounter problems with either the software or documentation. Technical assistance will be provided by Parsons, Brinckerhoff, Quade & Douglas, Inc. (PBQ&D) through a contract with the Transportation Systems Center of the United States Department of Transportation (TSC). This contract will be in effect until about April, 1980.

This service is provided to the SES program users in an effort to foster the use of improved subway design techniques and for the benefit of transit-using public.

II. LIMITATIONS

Technical assistance is provided under these guidelines subject to the following limitations:

1. Maintenance will only be provided for the Subway Environment Simulation (SES) Program, Version 2, as updated to include all subsequent revisions or versions.

2. This assistance does not include problems related to computer hardware, operating system problems or limitations, or problems related to a particular computer installation.

3. Any user modifications to the SES, except array size adjustment, are not covered under these guidelines. However, assistance may be given for problems which are not related to user modifications.

4. These guidelines provide for technical assistance relating to software and documentation problems only. Only a very limited amount of application assistance can be provided.

5. All technical assistance is subject to the prior approval of the TSC.

III. REGISTRATION

SES program users are requested to complete the attached "User Registration Form" and send it to PBQ&D at the address given in Section VII below. Only registered users of the SES program will be provided with software or documentation revisions or may receive technical assistance under these guidelines.

IV. SES REVISIONS

When necessary, all registered users of the SES program will be notified of program revisions. These revisions will contain the following information:

Revision Number and Date
(for identification)

Problem (brief description of problem)

Symptoms (visible signs of problems)

Correction
(how to correct problem - usually program change)

Effect on Previous Results
(validity of results obtained prior to implementing this revision)

General Notes

The current version of the SES is:

Version 2, Revision No. 14 Date: August 12, 1977

V. USER'S RESPONSIBILITY

The SES user must perform the following tasks:

A. Provide himself with technical computer expertise to do the following:

a. Make the SES program operational on his own or a vendor's computer.

b. Prepare his own operating system control cards.

c. Transcribe his data from input forms to machine readable form and submit problems for processing.

d. Possess a reasonable understanding of the error messages generated by his computer's operating system.

e. Understand Chapters 1 and 3 of the Programmers Manual which relate to the program software/hardware interface.

B. Run the SAMPL5 test problem to verify that the program is operating properly.

C. Be familiar with the information in the SES User's Manual.

D. Incorporate the SES Program Revisions as soon as possible.

VI. REQUIREMENTS TO RECEIVE ASSISTANCE

The user may be asked to provide the following information and/or items to assist in locating and correcting the problem:

A. A description of the problem, its nature and symptoms.

B. A copy of the computer output indicating the problem, and other outputs on which the same or a similar problem was observed.

C. A SES schematic diagram for the run(s) in B above, with node numbers, section numbers, line segment numbers, and ventilation shaft segment numbers indicated.

D. A listing and/or card deck of the input data for which the problem occurred.

E. FORTRAN compiler output showing:

1. A listing of the source statements ("SOURCE" option on IBM).

2. A table of variable names showing type and storage location ("MAP" option on IBM).

3. A table of statement labels showing the relative address assigned to the label ("MAP" option on IBM).

4. An object language listing in a psuedo assembler language format may be requested on an individual subroutine basis ("LIST" option on IBM).

F. Linkage Editor (or Allocator) output showing:

1. A list of the control statements ("LIST" option on IBM).

2. A map of the load module (or main memory) showing the relative location and length of the main program and subroutine ("XREF" option on IBM).

In cases where the problem is suspected to be machine dependent, or related to the operating environment of the machine on which it occurred, the user may be asked to make additional runs on his computer <u>at his expense</u> to help locate the problem. The user may choose not to make these additional runs, however this will probably cause efforts to correct the problem to cease.

It is expected that all items supplied to PBQ&D will be returned to the user, however, no responsibility is assumed for loss or damage to any items supplied.

The information provided by the user concerning his application on which the problem occurred (Items B, C and D) will be held in confidence by PBQ&D and the TSC if so requested.

VII. PROBLEM REPORTING PROCEDURE

If a problem occurs the user should first check to be sure that it is not caused by erroneous input data. If the user believes the problem is caused by a program malfunction, he can then obtain assistance under this plan.

To obtain assistance the user must first notify the TSC, at the address below, and receive their approval.

Mr. Neil Meltzer
Code 233
U.S. Department of Transportation
Transportation Systems Center
Kendall Square
Cambridge, Mass. 02142

Telephone: (617) 494-2192

After TSC approval is obtained, the user may communicate directly with PBQ&D at the address below:

Mr. William D. Kennedy
Parsons Brinckerhoff Quade & Douglas, Inc.
250 West 34th Street
New York, N.Y. 10001

Telephone: (212) 239-7945

or, in his absence

Mr. James W. Guinan
Parsons Brinckerhoff Quade & Douglas, Inc.
250 West 34th Street
New York, N.Y, 10001

Telephone: (212) 239-5159

VIII. RECORDKEEPING

Records will be kept of all work performed by PBQ&D under these guidelines. A file will be maintained for each registered SES user which will contain the following information:

1. User Registration Form

2. All written correspondence

SUBWAY ENVIRONMENT SIMULATION (SES) COMPUTER PROGRAM

USER REGISTRATION FORM

Firm Name: _____

Address: _____

_____

_____

Representative		Alternate	
Name:	_____	Name:	_____
Address:	_____	Address:	_____
	_____		_____
	_____		_____
Telephone:		Telephone:	

Computer Configuration

Make: _____

Model: _____

Main Memory: _____ words / bytes

Vendor (if applicable): _____

_____

_____

_____

Operating System: _____

Disks (number and model): _____

_____

Drums (number and model): _____

_____

Tapes (number, model and tracks): _____

_____

Other Information: _____

_____

_____

_____

SUBWAY ENVIRONMENT SIMULATION (SES) COMPUTER PROGRAM

USER REGISTRATION FORM

SES Program Information

Source: ☐ T.S.C. or PBQ&D Date: _____

☐ Other _____ Date: _____

Version: _____ Latest Modification Level: _____

User Modifications: _____

_____

_____

_____

_____

Application (optional): _____

_____

_____

Comments: _____

_____

_____

_____

Information Supplied By: _____ Date: _____

APPENDIX B

USER'S AND PROGRAMMER'S MANUAL REVISIONS

The revisions contained in this appendix were issued to all registered SES Users to update their User's Manual (Ref. 1) and Programmer's Manual (Ref. 2). Fourteen revisions to the User's Manual and one revision to the Programmer's Manual were issued during the project.

REFERENCES

1. Associated Engineers/A Joint Venture, Subway Environmental Design Handbook, Vol. II, Subway Environment Simulation Computer Program (SES), Part 1: User's Manual, prepared by Parsons Brinckerhoff Quade & Douglas, Inc., for U.S. Department of Transportation, National Technical Information Service Number PB 254 789, 1975.

2. Associated Engineers/A Joint Venture, Subway Environmental Design Handbook, Vol. II, Subway Environment Simulation Computer Program (SES), Part 2: User's Manual, prepared by Parsons Brinckerhoff Quade & Douglas, Inc., for U.S. Department of Transportation, National Technical Information Service Number PB 254 790, 1975.

TABLE OF CONTENTS

Section		Page
	USER'S MANUAL REVISIONS	
I.	Revision No. 1	B-4
II.	Revision No. 2	B-5
III.	Revision No. 3	B-6
IV.	Revision No. 4	B-7
V.	Revision No. 5	B-8
VI.	Revision No. 6	B-9
VII.	Revision No. 7	B-10
VIII.	Revision No. 8	B-11
IX.	Revision No. 9	B-12
X.	Revision No. 10	B-13
XI.	Revision No. 11	B-14
XII.	Revision No. 12	B-15
XIII.	Revision No. 13	B-16
XIV.	Revision No. 14	B-17
	PROGRAMMER'S MANUAL REVISIONS	
I.	Revision No. 1	B-19

November 18, 1976

SUBWAY ENVIRONMENT SIMULATION (SES) COMPUTER PROGRAM

USERS MANUAL REVISIONS NUMBERS 1 THROUGH 13

1. Page 10-16. Corrected upper limit of NUMBER OF TRAIN ROUTES from 4 to 6.

2. Page 10-64. Corrected lower limit of FAN LOWER FLOW LIMIT from -50,000 to -100,000.

3. Page 10-84. Clarified explanation of TOTAL WEIGHT OF RESISTANCE ELEMENTS PER CAR.

4. Page 10-94. Clarified explanation of RESISTANCES.

5. Appendix H, Brief Instructions for FORM 1E. Corrected upper limit of NUMBER OF TRAIN ROUTES from 4 to 6 (same correction as Page 10-16).

6. Appendix H, Brief Instructions for FORM 7A. Corrected lower limit of FAN LOWER FLOW LIMIT FROM -50,000 to -100,000 (same correction as Page 10-64).

7. Appendix H, Brief Instructions for FORM 9C. Clarified explanation of TOTAL WEIGHT OF RESISTANCE ELEMENTS PER CAR (same correction as Page 10-84).

8. Appendix H, Brief Instructions for FORM 9H. Clarified explanation of RESISTANCES (same correction as Page 10-94).

9. Page 8-18, Chopper Input Instructions Clarified.

10. Page 8-32, Chopper Input Instructions Clarified.

11. Page 8-33, Chopper Input Instructions Clarified.

12. Page 8-35, Chopper Input Instructions Clarified.

13. Page 8-35a, Chopper Input Instructions Added.

FORM 1E - GENERAL DATA

NUMBER OF TRAIN ROUTES : This number corresponds to the total number of train routes in the system.
$0. \leq X \leq 6.$ Error type 73, 134, 135

NUMBER OF TRAIN TYPES : This number corresponds to the total number of train types in the system.
$0. \leq X \leq 3.$ Error type 73, 136, 137

NUMBER OF ENVIRONMENTAL CONTROL ZONES : This number corresponds to the total number of environmental control zones in the system.
$0. \leq X \leq 30.$ Error type 100

FAN STOPPING/WINDMILLING OPTION : If a fan either exceeds its upper or lower fan operating limits, the program provides two options:

1. The simulation will stop immediately.
2. The fan will be turned off, but the simulation will continue.

$1. \leq X \leq 2.$ Error type 11

NUMBER OF TRAINS IN OPERATION AT INITIALIZATION : Enter the total number of trains, regardless of their route, that have been dispatched and are operating within the system prior to the beginning of the simulation.
$0. \leq X \leq 30.$ Error type 141

FORM 7A - FAN DESCRIPTION

FAN IDENTIFICATION : Information identifying the fan being described will appear on the input verification printout. Up to 36 alphameric characters can be used.

AIR DENSITY AT WHICH THE FAN PERFORMANCE CURVE WAS MEASURED : Enter the air density at which the manufacturer measured the fan performance curve. The program will internally adjust the fan performance curve to adjust for the difference between this density and the system ambient density.

$0.040 \leq X \leq 0.085$ lb/Cu Ft — Error type 187

TIME REQUIRED FOR FAN TO REACH FULL OPERATING SPEED : This number corresponds to the amount of time required of the fan to overcome the inertial effects of its blades and motor in reaching its full operating speed.

$X \leq 300$ Sec. — Error type 176

FAN LOWER FLOW LIMIT : Enter the minimum volume flowrate that may be obtained by this fan. If this fan falls below this limiting flowrate, the simulation will do one of the following, depending upon the fan stopping/windmilling option entered in Form 1E.

1. If fan stopping/windmilling option = 1., the fan will shut off and the simulation will continue.
2. If fan stopping/windmilling option = 2., the fan will shut off and the simulation will terminate immediately.

$-100{,}000 \leq X \leq 0$ CFM — Error type 193

FAN UPPER FLOW LIMIT : Enter the maximum volume flowrate that may be obtained by this fan. If this fan exceeds this limiting flowrate, the simulation will do one of the following, depending upon the fan stopping/windmilling option entered in Form 1E.

1. If fan stopping/windmilling option = 1., the fan will shut off and the simulation will continue.
2. If fan stopping/windmilling option = 2., the fan will shut off and the simulation will terminate immediately.

$1{,}000 \leq X \leq 2{,}000{,}000$ CFM — Error type 194

FORM 9C - TRAIN DATA

Skip this form if the Train Performance Option is 0.

TOTAL WEIGHT OF RESISTANCE ELEMENTS PER CAR	:	This value represents the weight of all the acceleration and/or deceleration resistor grid elements which actually resist current flow in a resistor grid arrangement for this train type. This value does not include any weight of the resistor grid supporting structure. A value of zero (0.) indicates an instantaneous heat release mechanism is to be used for that grid. If a 0. is entered for a grid, the remaining entries for the grid may be zero. 0. < X < 2,000. lbs — Error type 101, 102
EFFECTIVE DIAMETER OF AN ELEMENT	:	This value represents a characteristic resistor grid element diameter for all the acceleration and/or deceleration grids in this train type. 0. < X < 24. In. — Error type 103, 104
EFFECTIVE SURFACE AREA FOR CONVECTION PER CAR	:	This value represents the sum of the effective surface area for convection calculations of each element in the acceleration and/or deceleration resistor grid arrangement for this train type. This value is a function of the physical geometry of each element and the location of the resistor grid arrangement relative to the underside of the car. 0. < X < 500. Sq Ft — Error type 105, 106
EFFECTIVE SURFACE AREA FOR RADIATION PER CAR	:	This value represents the sum of the effective surface area for radiation calculations of each element in the acceleration and/or deceleration resistor grid arrangement for this train type. The effective area is defined as the product of the actual surface area of an element and its shape factor with regard to the surroundings enclosing the resistor grid arrangement. 0. < X < 500. Sq Ft — Error type 107, 108
EMISSIVITY OF THE RESISTANCE ELEMENT	:	This value represents the emissivity of a typical acceleration and/or deceleration resistor grid element surface evaluated at an average grid temperature for this train type. 0. < X < 1. — Error type 109, 110
SPECIFIC HEAT OF THE RESISTANCE ELEMENT	:	This value represents the specific heat of an acceleration and/or deceleration resistor grid element evaluated at an effective grid temperature. 0. < X < 1. Btu/(lb - Deg F) — Error type 111, 112
INITIAL GRID TEMPERATURES	:	The initial temperature of the acceleration and/or deceleration resistor grids corresponds to the temperature of the grids at the time the trains are dispatched onto their respective route. A blank entry or zero indicates that the resistor grid is to be initialized at ambient temperature.

FORM 9H - TRAIN DATA

Skip this form if the Train Performance Option is 0. or 3.

RESISTANCE SPEEDS : The two train speeds entered here are used in the definition of the external resistance versus train speed curve. The first entry is the speed at which transition occurs; the second is the speed at which field strength reduction begins. If a chopper controlled train is being simulated, 0.0 must be entered for the two resistance speeds.

0. < X < 100.MPH Error type 62

RESISTANCES : Three resistance values must be given to describe the motor circuit resistance. These are: first, the external plus internal resistance at zero train speed; second, the external plus internal resistance just after transition has occurred; and third, the internal resistance of the motor armature and field. If a chopper-controlled train is being simulated, 0.0 must be entered for the first two entries, but the third entry, the internal resistance of the motor armature and field must still be entered.

0.001 < X < 3. ohms Error type 61

FORM 1E - GENERAL DATA

NUMBER OF TRAIN ROUTES	: This number corresponds to the total number of train routes in the system. $0. \leq X \leq 6.$	Error type 73, 134, 135
NUMBER OF TRAIN TYPES	: This number corresponds to the total number of train types in the system. $0. \leq X \leq 3.$	Error type 73, 136, 137
NUMBER OF ENVIRONMENTAL CONTROL ZONES	: This number corresponds to the total number of environmental control zones in the system. $0. \leq X \leq 30.$	Error type 100
FAN STOPPING/WINDMILLING OPTION	: If a fan either exceeds its upper or lower fan operating limits, the program provides two options: 1. The simulation will stop immediately. 2. The fan will be turned off, but the simulation will continue. $1. \leq X \leq 2.$	Error type 11
NUMBER OF TRAINS IN OPERATION AT INITIALIZATION	: Enter the total number of trains, regardless of their route, that have been dispatched and are operating within the system prior to the beginning of the simulation. $0. \leq X \leq 30.$	Error type 141

FORM 7A - FAN DESCRIPTION

FAN IDENTIFICATION : Information identifying the fan being described will appear on the input verification printout. Up to 36 alphameric characters can be used.

AIR DENSITY AT WHICH THE FAN PERFORMANCE CURVE WAS MEASURED : Enter the air density at which the manufacturer measured the fan performance curve. The program will internally adjust the fan performance curve to adjust for the difference between this density and the system ambient density.

$0.040 \leq X \leq 0.085$ lb/Cu Ft — Error type 187

TIME REQUIRED FOR FAN TO REACH FULL OPERATING SPEED : This number corresponds to the amount of time required of the fan to overcome the inertial effects of its blades and motor in reaching its full operating speed.

$X \leq 300$ Sec. — Error type 176

FAN LOWER FLOW LIMIT : Enter the minimum volume flowrate that may be obtained by this fan. If this fan falls below this limiting flowrate, the simulation will do one of the following, depending upon the fan stopping/windmilling option entered in Form 1E.

1. If fan stopping/windmilling option = 1., the fan will shut off and the simulation will continue.
2. If fan stopping/windmilling option = 2., the fan will shut off and the simulation will terminate immediately.

$-100{,}000 \leq X \leq 0$ CFM — Error type 193

FAN UPPER FLOW LIMIT : Enter the maximum volume flowrate that may be obtained by this fan. If this fan exceeds this limiting flowrate, the simulation will do one of the following, depending upon the fan stopping/windmilling option entered in Form 1E.

1. If fan stopping/windmilling option = 1., the fan will shut off and the simulation will continue.
2. If fan stopping/windmilling option = 2., the fan will shut off and the simulation will terminate immediately.

$1{,}000 \leq X \leq 2{,}000{,}000$ CFM — Error type 194

FORM 9C - TRAIN DATA

Skip this form if the Train Performance Option is 0.

TOTAL WEIGHT OF RESISTANCE ELEMENTS PER CAR	:	This value represents the weight of all the acceleration and/or deceleration resistor grid elements which actually resist current flow in a resistor grid arrangement for this train type. This value does not include any weight of the resistor grid supporting structure. A value of zero (0.) indicates an instantaneous heat release mechanism is to be used for that grid. If a 0. is entered for a grid, the remaining entries for the grid may be 0. 0. $\leq$ X $\leq$ 2,000. lbs — Error type 101, 102
EFFECTIVE DIAMETER OF AN ELEMENT	:	This value represents a characteristic resistor grid element diameter for all the acceleration and/or deceleration grids in this train type. 0. $\leq$ X $\leq$ 24. In. — Error type 103, 104
EFFECTIVE SURFACE AREA FOR CONVECTION PER CAR	:	This value represents the sum of the effective surface area for convection calculations of each element in the acceleration and/or deceleration resistor grid arrangement for this train type. This value is a function of the physical geometry of each element and the location of the resistor grid arrangement relative to the underside of the car. 0. $\leq$ X $\leq$ 500. Sq Ft — Error type 105, 106
EFFECTIVE SURFACE AREA FOR RADIATION PER CAR	:	This value represents the sum of the effective surface area for radiation calculations of each element in the acceleration and/or deceleration resistor grid arrangement for this train type. The effective area is defined as the product of the actual surface area of an element and its shape factor with regard to the surroundings enclosing the resistor grid arrangement. 0. $\leq$ X $\leq$ 500. Sq Ft — Error type 107, 108
EMISSIVITY OF THE RESISTANCE ELEMENT	:	This value represents the emissivity of a typical acceleration and/or deceleration resistor grid element surface evaluated at an average grid temperature for this train type. 0. $\leq$ X $\leq$ 1. — Error type 109, 110
SPECIFIC HEAT OF THE RESISTANCE ELEMENT	:	This value represents the specific heat of an acceleration and/or deceleration resistor grid element evaluated at an effective grid temperature. 0. $\leq$ X $\leq$ 1. Btu/(lb - Deg F) — Error type 111, 112
INITIAL GRID TEMPERATURES	:	The initial temperature of the acceleration and/or deceleration resistor grids corresponds to the temperature of the grids at the time the trains are dispatched onto their respective route. A blank entry or zero indicates that the resistor grid is to be initialized at ambient temperature.

FORM 9H - TRAIN DATA

Skip this form if the Train Performance Option is 0. or 3.

RESISTANCE SPEEDS : The two train speeds entered here are used in the definition of the external resistance versus train speed curve. The first entry is the speed at which transition occurs, the second is the speed at which field strength reduction begins. If a chopper-controlled train is being simulated, 0.0 must be entered for the two resistance speeds.

0. < X < 100.MPH Error type 62

RESISTANCES : Three resistance values must be given to describe the motor circuit resistance. These are: first, the external plus internal resistance at zero train speed; second, the external plus internal resistance just after transition has occurred; and third, the internal resistance of the motor armature and field. If a chopper controlled train is being simulated, 0.0 must be entered for the first two entries, but the third entry, the internal resistance of the motor armature and field, must still be entered.

0.001 < X < 3. ohms Error type 61

out of the motor circuit. By eliminating the need for external resistance, the chopper at once demonstrates a savings in traction power requirements and a reduction in heat input to the tunnel air.

At base speed, the full motor rated voltage is applied to the motors. For example, in the case of the Westinghouse chopper system used in the BART and Sao Paulo Metro cars, the chopper switches at a normal frequency of 218HZ with an "off" interval of about 6% of the total cycle time. To further extend the high-power portion of the accelerating cycle beyond base speed, motor field weakening is employed, as in the case of the cam-controlled train.

Cam Controller vs. Chopper Controller

Cam Controller -

Advantages

1. Thoroughly tested and refined through years of service.
2. Lower initial cost and also lighter.
3. Does not require separate blowers for equipment cooling.
4. Simplicity of the circuits makes trouble-shooting relatively easy and keeps maintenance skills to a minimum.

Disadvantages

1. More maintenance required for periodic replacement of switch contacts.
2. Ride quality may not be smooth, depending on the number and arrangement of resistance notches; and large step current changes may aggravate wheel spin and slip.
3. Acceleration resistor grids make the power consumption per car-mile higher than the chopper control and generate heat.
4. Only rheostatic braking is practical, and as a result, more heat is generated.

The line current varies linearly from zero speed up to base speed. (See Figure 8.8.) This is caused by the linear variation of the chopper duty cycle (duty cycle $= \frac{t_{on}}{t_{on} + t_{off}}$). The voltage imposed across the motors increases with increasing duty cycle and the back EMF from the motors increases linearly with speed. Therefore, to maintain a constant current through the motors the voltage imposed on the motors must be increased proportionally. The line current also increases because of the transformer action of the chopper (i.e., $E \times I = \frac{E_2 \times I_2}{\eta}$).

Tractive Effort versus Train Speed

This curve consists of three portions: a constant portion, and two hyperbolic portions. Tractive effort is constant from zero train speed through point 1 to point 2. Field strength reduction begins at point 2 and ends at point 3, and over this range the tractive effort is assumed to vary hyperbolically with respect to train speed. Points 3, 4 and 5 are on the minimum field strength motor curves, which are approximated by a 2nd order hyperbola. Point 3 is the point at which the minimum field strength curve intersects the design current. Point 5 should correspond to a high train speed which the train would not normally exceed, and point 4 would be an arbitrary point which is approximately equi-distant from points 3 and 5.

Motor Current versus Train Speed

This curve consists of two portions: a constant portion and a polynomial portion. The constant portion of the curve extends from zero train speed to the speed at which field strength reduction is completed (point 3). The actual current through the motors is constant at the design value from zero to point 2, but may fluctuate above and below the design value during the field strength reduction, from point 2 to point 3. If present, these fluctuations

are approximately equal above and below the design current so that the current may be considered constant through this phase of the train operation. Once the minimum field strength is reached the motor current begins to decrease with increasing train speed. Points 4 and 5 define this portion of the curve. In this case the points on the curve are used to define the motor current versus speed relationship. It should be understood that these points are at exactly the same speeds, and are actually the same points as those used in defining the tractive effort versus speed relationship.

Line Current Versus Train Speed

The line current versus train speed relationship for a chopper-controlled train is approximated by a curve which consists of three portions: a linear portion, a constant portion and a polynomial portion. The linear portion extends from zero train speed to the speed at which field strength reduction begins (point 2). The current is held at nearly a constant value until field reduction is completed (point 3). Once the minimum field strength is reached, the line current begins to decrease with increasing train speed. Points 4 and 5 define this portion of the curve.

8.5 Entering Motor Performance Characteristics (Input Form 9F)

The motor performance characteristics are described to the SES program by specifying the train speed, tractive effort and motor current which correspond to certain critical points on the motor characteristic curves. Each point consists of a set of three corresponding readings, one from each scale on the motor curves (see Figure 8.6). Four points must be specified on Input Form 9F:

First. The speed at which field strength reduction begins--this is the point where the starting current line intersects the maximum field strength train speed curve (point 2 on Figure 8.6).

R_M = the armature and motor field resistance, ohms

E_L = line voltage

η = chopper efficiency

The value of the line current for the remaining speeds is obtained by substituting the value of the corresponding motor current, entered on input form 9F, in the following equation:

$$I_L = \frac{2I_M \cdot \alpha_{MAX}}{\eta}$$

where: α_{MAX} = the limiting value of the chopper duty cycle, i.e., $\alpha = \frac{t_{on}}{t_{on} + t_{off}}$

I_M = the motor current, amps

In addition, the limiting value of the chopper duty cycle can be obtained from:

$$\alpha_{MAX} = \frac{2E_M}{E_L}$$

where:

E_M = the rated motor voltage

It should be noted that in general the limiting value of the duty cycle of the chopper, α_{MAX}, will not be equal to 1.0 (i.e., the chopper will not attain a full conducting mode). For example, if the line voltage is 750 volts and the rated voltage for each traction motor is 300 volts, α_{MAX} will be 0.8.

The user has the option of entering two values for the chopper efficiency. The first value entered will apply for train speeds ranging from zero to U1. The second value entered will apply for speeds greater than U1. The speed

U1 is entered as miles per hour. If the user wishes to specify only one efficiency, he must enter a number for U1 greater than the maximum speed reached by the train during the simulation.

The user must enter a value for the regenerative braking effectiveness. If dynamic (rheostatic) braking is called for, ZERO (0.0) must be entered for the regeneration effectiveness.

8.7 External Resistance versus Train Speed (Input Form 9H)

This curve consists of two portions, both of which are linear with respect to train speed but are separated by a discontinuity. The two portions may have different slopes. The initial value at zero train speed is the value of the acceleration grid resistance which is in the circuit when the train starts from rest. This external resistance is decreased in steps until its value is zero at the transition speed (point 1). For the purposes of the simulation, each individual step is ignored and this decrease in resistance is considered to be linear with respect to train speed.

At the transition speed (point 1), the motor circuit is switched from series to series-parallel connection. The acceleration resistor grids are

August 12, 1977

SUBWAY ENVIRONMENT SIMULATION (SES) COMPUTER PROGRAM

USER'S MANUAL REVISION NUMBER 14

Page 4-65 is revised. A user suggestion for preparing fan operating times was added.

the fan performance curve to account for the difference between the two densities. This given density is usually .075 Lbs/cu. ft.

Fan Type. Two fans are the same type only if they possess identical fan curve, run-up times, upper and lower operating flow limits, and air densities at which the fan performance curves were measured. Data describing each different fan type must be entered in Forms 7A and 7B. The fan type identification numbers are assigned to each fan type according to the order in which the fans are entered in the data. The first fan type entered is fan type 1, the second fan type entered is fan type 2, and so on until all the fan types have been entered in the data.

User Suggestion. A user may locate a fan in a ventilation shaft but not operate the fan during the simulation by entering a number greater than the Maximum Simulation Time for the Simulation Time After Which Fan Switches On.

In version 2 of SES,the fan run-up curve is applied to both fan run-up (after switching "on") and run-down (after switching "off"). This means that the fan remains active past the Simulation Time After Which Fan Switches Off (on Input Form 5C) for a time equal to the Time Required For Fan To Reach Full Operating Speed (on Input Form 7A). To prevent unwanted fan operation, it is suggested that the fan switch-on time and switch-off time be set to a time greater than the largest Maximum Simulation Time which is anticipated.

I. Revision No. 1

November 18, 1976

SUBWAY ENVIRONMENT SIMULATION (SES) COMPUTER PROGRAM

PROGRAMMERS MANUAL REVISION NUMBER 1

1. Appendix E, Page 3. The table used for Core Storage Computation has been corrected to be consistant with Version 2 of the SES. These corrections did not affect the following page, Page 4 of Appendix E.

Description	Limit Variable 1	Limit Variable 2	Array Size	No. of Arrays	Total
General Variables	------		1	112	112
Array Size Limits	------		1	29	29
Physical Constants	------		1	25	25
Section Variables	LMSECT		140	26	3640
Section +2	LMSECT+2		142	1	142
Sections times 3	LMLPLK		420	1	420
Section External I.D. Nos.	LMSCTX		400	1	400
Node Variables	LMNODE		130	5	650
Node +2	LMNODE+2		132	2	264
Nodes times No. of Sections attached to node	LMNODE	LMSCND	130*5	2	1300
Node External I.D. Nos.	LMNODX		400	1	400
Aerodynamic Node Table	LMTBL2		1500	1	1500
Aerodynamic Node Coefficients	LMCOND		950	1	950
Thermodynamic Node Variables	LMTHND		140	4	560
Thermo. Nodes times No. of Sections attached to node	LMTHND	LMSCND	140*5	3	2100
Flow Loops	LMNLOP		75	4	300
Aerodynamic Coefficient Matrix	LMBLP		1000	1	1000
Line Segment Variables	LMLSEG		90	45	4050
Line Segment times No. of Trains in Line Seg.	LMLSEG	LMTRSG	90*8	3	2160
Ventilation Shaft Section Variables	LMVSEG		60	32	1920
Total Subsegments (line and vent shaft)	LMSS		300	47	14100
Line Subsegments	LMLSS		250	10	2500
Line Subsegments times Train Route	LMLSS	LMTRRT	250*6	1	1500
Zone Cluster Variables	LMCLST		30	1	30
Train Type Variables	LMTRTP		3	65	195
Underplatform Exhaust Variables	------		1	4	4
Train Route Variables	LMTRRT		6	9	54
Dispatcher Group times Routes	LMTRGP	LMTRRT	15*6	3	270
Track Sections times Routes	LMTSRT	LMTRRT	260*6	7	10920
Exp. T.P. Profile Pts. times Routes	LMEXPD	LMTRRT	201*6	3	3618
Operational Train Variables	LMTRAN		30	33	990
Fan Type Variables	LMFNTP		4	11	44
Unsteady Heat Load Variables	LMUL		10	5	50
Patron Characteristics	------		1	1	1
Print Group Variables	LMPRGP		15	4	60
					56258

APPENDIX C

SOURCE CODE REVISIONS

The revisions contained in this appendix apply to Version 2 of SES. They were issued to all registered users. 14 revisions to the SES source code were issued during the project.

TABLE OF CONTENTS

Section		Page
I.	Revision No. 1	C-3
II.	Revision No. 2	C-10
III.	Revision No. 3	C-28
IV.	Revision No. 4	C-46
V.	Revision No. 5	C-62
VI.	Revision No. 6	C-70
VII.	Revision No. 7	C-77
VIII.	Revision No. 8	C-85
IX.	Revision No. 9	C-115
X.	Revision No. 10	C-121
XI.	Revision No. 11	C-124
XII.	Revision No. 12	C-127
XIII.	Revision No. 13	C-129
XIV.	Revision No. 14	C-132

SUBWAY ENVIRONMENT SIMULATION (SES) COMPUTER PROGRAM

REVISION NO. 1 TO VERSION 2

Problem

The rate of train Power Loss has been found to be incorrect when a train was coasting downhill.

Symptoms

An additional term, which is the rate of change of the train's potential energy, was being included in the calculation of train Power Loss when a train was coasting downhill. This resulted in an overestimation of the rate of train Power Loss, and subsequently the rate of train Heat Rejection.

Correction

See attached corrected listing of subroutine HEAT. Corrected lines are indicated by a "C."

Effect on Previous Results

Previous results would show an overestimation of the train Power Loss and Heat Rejection by an amount equal to the change in the train's potential energy while the train is coasting downhill.

```
        COMPILER OPTIONS - NAME=  MAIN,OPT=02,LINECNT=57,SIZE=0000K,
                           SOURCE,EBCDIC,NOLIST,NODECK,LOAD,MAP,NOEDIT,ID,NOXREF
ISN 0002            SUBROUTINE  HEAT( NUMV, ITYP, TE, AMPS, AMPL )                    00858000
                C                                                                     00858100
                C*****THIS SUBROUTINE COMPUTES THE RATE OF HEAT INPUT (IN BTU/SEC/ENTIRE00859200
                C*****TRAIN) INTO BOTH THE ACCLERATION RESISTOR GRIDS (QACC OR QACCV)  00858300
                C*****AND THE DECELERATION RESISTOR GRIDS (QDEC OR QDECV) FOR TRAIN    00853400
                C*****PERFORMANCE OPTIONS 1 AND 2. IN ADDITION THE MOTOR CURRENT (AMPS 00858500
                C*****OR AMPV) AND THE LINE CURRENT (AMPL OR AMPLV) ARE SET TO ZERO IF 00858600
                C*****THE TRAIN MOTORS ARE NOT BEING USED                             00858700
                C                                                                     00858800
                C     INCLUDE  DSHARE                                                 00858900
                C                                                                     00859000
                C ************************* INTEGER VARIABLES ************************ C00859100
                C                                                                     00859200
                C  GENERAL VARIABLES                                                  00859300
ISN 0003            INTEGER   AFTIME, BLANK, BLPREQ, DATE(8), DEATH, DESPER, FSCFT    00859400
ISN 0004            INTEGER   HCOPT, HSOPT, HUMOPT, OUT, PRTIME, SLASH, SUPOPT        00859500
ISN 0005            INTEGER   SYSTEM(18), THOPT, THTIME, TNLSS, TNSS, TPOPT, TRTIME   00859600
                C  SECTION VARIABLES  (LMSECT)                                        00859700
ISN 0006            INTEGER   NTOPS(140)                                              00859800
ISN 0007            INTEGER   TABL9(140), TABL10(140), TABL11(140), TABL12(140)        00859900
ISN 0008            INTEGER   TABL13(140), TABL20(140), TABL21(140)                   00860000
                C    SECTION (LMSECT), SECTION+ONE  (LMSECT+1) ,  SECTION+TWO (LMSECT+2)00860100
ISN 0009            INTEGER   ND(140), NDS(141), NDSS(142)                            00860200
                C    SECTION * ESTIMATED AVERAGE OF 3 LOOPS THROUGH SECTION ( LMLPK )  00860300
ISN 0010            INTEGER   LKAN(420)                                               00860400
                C    SECTION EXTERNAL IDENTIFICATION NUMBERS (LMSCTX)                 00860500
ISN 0011            INTEGER   TABL14(400)                                             00860600
                C  NODE VARIABLES  (LMNODE)                                           00860700
ISN 0012            INTEGER   TABL1(132), TABL15(130), TABL16(130), TABL22(130)       00860800
ISN 0013            INTEGER   TABL23(132), TABL45(130), TYPTND(130)                   00860900
                C  AERODYNAMIC NODE VARIABLES (LMTBL2)                                00861000
ISN 0014            INTEGER   TABL2(1500)                                             00861100
                C    NODES BY NUMBER OF SECTIONS CONNECTED TO NODE (LMNODE X LMSCND)  00861200
ISN 0015            INTEGER   TABL17(130,5), TABL18(130,5)                            00861300
                C    NODE EXTERNAL IDENTIFICATION NUMBERS (LMSCTX)                    00861400
ISN 0016            INTEGER   TABL19(400)                                             00861500
                C  LOOP VARIABLES  (LMNLOP)                                           00861600
                C  LINE SEGMENT VARIABLES  (LMLSEG)                                   00861700
ISN 0017            INTEGER   NTRNLS(90), NUMLS(90), TABL3(90), TABL4(90), TABL8(90)  00861800
ISN 0018            INTEGER   TYPLS(90)                                               00861900
                C    LINE SEGMENT BY NUMBER OF TRAINS IN SEGMENT  (LMLSEG X LMTRSG)   00862000
ISN 0019            INTEGER   TRNNLS(90,8)                                            00862100
                C  VENTILATION SHAFT SEGMENT VARIABLES    ( LMVSEG )                  00862200
ISN 0020            INTEGER   FTOFVS(60), FTONVS(60), NUMVS(60)                       00862300
ISN 0021            INTEGER   TABL6(60), TYPVS(60), EXVOVS(60), FTYPVS(60), TABL5(60) 00862400
                C  SUBSEGMENT VARIABLES  (LMSS)                                       00862500
ISN 0022            INTEGER   TABL7(300), TABL44(300)                                 00862600
                C  LINE SUBSEGMENT VARIABLES   ( LMLSS X TABLE SIZE )                 00862700
ISN 0023            INTEGER   EXOTOR(250,6)                                           00862800
                C    LINE SUBSEGMENT BY TRAIN ROUTE ( LMLSS X LMTRRT )                00862900
ISN 0024            INTEGER   ITNLSS(250,6)                                           00863000
                C  HEATING OR COOLING ZONE CLUSTER VARIABLES  (LMCLST)                00863100
ISN 0025            INTEGER   TYPCL(30)                                               00863200
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                C  SUBWAY VEHICLE TYPE VARIABLES  (LMTRTP)                          00863300
ISN 0026            INTEGER   NCARV(3), NPCARV(3)                                   00863400
                C  UNDERPLATFORM EXHAUST VARIABLES                                  00863500
ISN 0027            INTEGER   DPTUX                                                 00863600
                C  ROUTE VARIABLES  (LMTRRT)                                        00863700
ISN 0028            INTEGER   COPTRT(6), NTSRT(6)                                   00863800
                C    DISPATCHER VARIABLES (LMTRRT) AND (LMTRGP X LMTRRT)            00863900
ISN 0029            INTEGER   GPTYPV(15,6), JGROUP(6), NGRV(6), NMTRGR(6)           00864000
ISN 0030            INTEGER   NTRGR(15,6)                                           00864100
ISN 0031            INTEGER   GPHDWY(15,6)                                          00864200
                C    TRACK SECTION VARIABLES  (LMTSRT X LMTRRT)                     00864300
ISN 0032            INTEGER   DWLTS(260,6)                                          00864400
ISN 0033            INTEGER   NPETTS(260,6), NSEGTS(260,6)                          00864500
                C    EXPLICIT TRAIN PERFORMANCE VARIABLES  (LMEXPD X LMTRRT)        00864600
ISN 0034            INTEGER   NEXPDP(6)                                             00864700
ISN 0035            INTEGER   TIMEV(201,6)                                          00864800
                C  OPERATIONAL TRAIN VARIABLES  (LMTRAN)                            00864900
ISN 0036            INTEGER   DPV(30), INDEX(30), IROTEV(30), ITYPV(30), MODEV(30)  00865000
ISN 0037            INTEGER   NTSV(30), NTSV2(30), TNUMV(30)                        00865100
ISN 0038            INTEGER   TLPSV(30), TSTRTV(30)                                 00865200
                C  FAN TYPE VARIABLES  (LMFNTP)                                     00865300
                C  UNSTEADY HEAT LOAD VARIABLES  ( LMUL )                           00865400
ISN 0039            INTEGER   LSSUL(10)                                             00865500
                C  PRINT GROUP VARIABLES  ( LMPRGP )                                00865600
ISN 0040            INTEGER   GINTPR(15), GRABBP(15), GRSUM(15), NPRGR(15)          00865700
                C                                                                   00865800
                C ************************* REAL VARIABLES ************************ C00865900
                C                                                                   00866000
                C  GENERAL VARIABLES                                                00866100
ISN 0041            REAL      NUAIR, MPHFPS                                         00866200
                C  SECTION VARIABLES                                                00866300
                C  NODE VARIABLES                                                   00866400
                C  LOOP VARIABLES                                                   00866500
                C  LINE SEGMENT VARIABLES                                           00866600
ISN 0042            REAL      LLS(90), LLSS(90)                                     00866700
                C  VENTILATION SHAFT SEGMENT VARIABLES                              00866800
ISN 0043            REAL      LVS(60), LVSS(60)                                     00866900
                C  SUBSEGMENT VARIABLES                                             00867000
ISN 0044            REAL      LHLTSS(300), LSUMSS(300)                              00867100
                C  LINE SUBSEGMENT VARIABLES                                        00867200
ISN 0045            REAL      LACLSS(250), LHLSS(250)                               00867300
                C  ZONE VARIABLES                                                   00867400
                C  SUBWAY VEHICLE TYPE VARIABLES                                    00867500
ISN 0046            REAL      LAMDAV(3), LHREV(3), LV(3), MCPGAV(3), MCPGDV(3)      00867600
ISN 0047            REAL      MOTORV(3)                                             00867700
                C  ROUTE VARIABLES                                                  00867800
                C    DISPATCHER VARIABLES                                           00867900
                C    TRACK SECTION VARIABLES                                        00868000
                C    EXPLICIT TRAIN PERFORMANCE VARIABLES                           00868100
                C  OPERATIONAL TRAIN VARIABLES                                      00868200
                C  FAN TYPE VARIABLES                                               00868300
                C  PRINT GROUP VARIABLES                                            00868400
                C                                                                   00868500
                C ***************************** COMMON ***************************** C00868600
                C                                                                   00868700
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                C GENERAL VARIABLES                                                 00868800
ISN 0048            COMMON   AETIME, ANNAMP, BLANK, BLPREQ, DATE, DEATH            00868900
ISN 0049            COMMON   DELAE, DELP, DELT, DELTH, DELTR, DEL2TH, DESPER, FSCFT 00869000
ISN 0050            COMMON   HCOPT, HMAMBE, HMAMBM, HOUR, HSOPT, HUMAMB, HUMOPT     00869100
ISN 0051            COMMON   IEQUAT, IN, INODE, IPRGRP, ISITU, JPATAE, JRATTH, JRATTR 00869200
ISN 0052            COMMON   KAERO, KASTEP, KBND1, KBND2, KBND3, KERNTH, KTSTEP, LIFE 00869300
ISN 0053            COMMON   LINES, MAXTIM, MONTH, MXMNPT, NBP, NBRJCT, NCLUST, NDELT 00869400
ISN 0054            COMMON   NDTYPA, NEW, NENTYP, NLOOP, NLS, NLSCP1, NLSEC, NNODE   00869500
ISN 0055            COMMON   NOSUMY, NOSYS, NOTRAN, NPGRP, NPORTL, NSEC, NSIMER      00869600
ISN 0056            COMMON   NTIME, NTNODE, NTRAN, NTRRTE, NTRTYP, NUMOL, NVSEC      00869700
ISN 0057            COMMON   NZONE, OUT, PAMB, PRTIME, SLASH                        00869800
ISN 0058            COMMON   SUMTST, SUPCPT, SYSTEM, TAMBA, TAMBM, TDBAMB           00869900
ISN 0059            COMMON   THOPT, THTIME, TNLSS, TNSS, TPOPT, TRTIME, TWBAMB, TWAMBE00870000
ISN 0060            COMMON   TWAMBM, WNTSUM                                         00870100
                C  ARRAY SIZE LIMITS                                                00870200
ISN 0061            COMMON   LMBLP,LMCLST,LMCOND,LMEOPM, LMEXPD, LMENTP, LMLPK, LMLPLK00870300
ISN 0062            COMMON   LMLSEG, LMLSS, LMNLOP, LMNODE, LMNODX, LMPRGP, LMSCND  00870400
ISN 0063            COMMON   LMSCTX, LMSECT, LMSS, LMSSTN, LMTBL2, LMTHND, LMTRAN   00870500
ISN 0064            COMMON   LMTRGP, LMTRRT, LMTRSG, LMTRTP, LMTSRT, LMUL, LMVSEG   00870600
                C  PHYSICAL CONSTANTS                                               00870700
ISN 0065            COMMON   ABTEMP, BTUFLB, CP, FLBBTU, FLBHP, FPSMPH, FTIN, GRACC 00870800
ISN 0066            COMMON   HVH2O, MPHFPS, NUAIR, PI, PR, RDPYAR, RHOGP, RHOMAS    00870900
ISN 0067            COMMON   RHOWHT, SAINHG, SAPSI, STEFAN, THCON, TONLB, VISAIR    00871000
ISN 0068            COMMON   WGCONS, WTBTUS                                         00871100
                C  SECTION VARIABLES  ( LMSECT )                                    00871200
ISN 0069            COMMON   ABIGHS(140), ALOWS(140), BCS(140), BS(140), CEPS(140)  00871300
ISN 0070            COMMON   CENS(140), DOOTS(140), MNQS(140), MXQS(140), NTOPS     00871400
ISN 0071            COMMON   OMEGS(140), QS(140), QSAVES(140), QSMX(140), QSMN(140) 00871500
ISN 0072            COMMON   SUMQNS(140), SUMQPS(140), TABL9, TABL10, TABL11, TABL12 00871600
ISN 0073            COMMON   TABL13, TABL20, TABL21, VHIGHS(140), VLOWS(140)        00871700
                C    SECTION + TWO  (LMSECT+2)                                      00871800
ISN 0074            COMMON   NDSS                                                   00871900
                C    SECTION * ESTIMATED AVERAGE OF 3 LOOPS THROUGH SECTION ( LMLPLK ) 00872000
ISN 0075            COMMON   LKAN                                                   00872100
                C    SECTION EXTERNAL IDENTIFICATION NUMBERS                        00872200
ISN 0076            COMMON   TABL14                                                 00872300
                C  NODE VARIABLES  ( LMNODE )                                       00872400
ISN 0077            COMMON   TABL1, TABL15, TABL16, TABL17, TABL18, TABL22, TABL23  00872500
ISN 0078            COMMON   TABL45, TYPTND                                         00872600
                C    NODE EXTERNAL IDENTIFICATION NUMBERS                           00872700
ISN 0079            COMMON   TABL19                                                 00872800
                C  AERODYNAMIC NODE VARIABLES  (LMTBL2)                             00872900
ISN 0080            COMMON   TABL2                                                  00873000
                C  AERODYNAMIC JUNCTION COEFFICIENTS ( LMCOND )                     00873100
ISN 0081            COMMON   COAEND(950)                                            00873200
                C  THERMODYNAMIC NODE VARIABLES  ( LMTHND )                         00873300
ISN 0082            COMMON   HAVGTN(140), HUMTN(140), TAVGTN(140), TDBTN(140)       00873400
                C    THERMODYNAMIC NODES BY NUMBER OF SECTIONS CONNECTED TO A NODE  00873500
                C    ( LMTHND X LMSCND )                                            00873600
ISN 0083            COMMON   EMHBTN(140,5), EMTBTN(140,5), FLOBTN(140,5)            00873700
                C  LOOP VARIABLES  ( LMNLOP )                                       00873800
ISN 0084            COMMON   DQCTLP(75), OMEGLP(75), QERRLP(75), QLP(75)            00873900
                C  AERODYNAMIC MATRIX OF COEFFICIENTS - ARRAY SIZE ESTIMATED AT     00874000
                C  APPROXIMENTLY 0.05*LMSECT**2  (LMBLP)                            00874100
ISN 0085            COMMON   BLP(1000)                                              00874200
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                C  LINE SEGMENT VARIABLES  ( LMLSEG )                                  00874300
ISN 0086            COMMON   ALS(90), CILS(90), CBNLS(90), CBPLS(90), CFNLS(90)       00874400
ISN 0087            COMMON   CFPLS(90), DBTLS(90), DTDELS(90), DTDMLS(90), DTHELS(90) 00874500
ISN 0088            COMMON   DTHMLS(90), DTWELS(90), DTWMLS(90), EPSLS(90), FFFLS(90) 00874600
ISN 0089            COMMON   FLS(90), LLS, LLSS, NAMLS(90,9), NTRNLS, NUMLS           00874700
ISN 0090            COMMON   PDRYLS(90), PERMLS(90), RELS(90), RNFLS(90), RPRMLS(90)  00874800
ISN 0091            COMMON   SURLSS(90), TABL3, TABL4, TABL8, THCNLS(2,90)            00874900
ISN 0092            COMMON   THDELS(2,90), TSNKLS(90), TYPLS, VOLLSS(90)              00875000
                C    LINE SEGMENT BY NUMBER OF TRAINS IN LINE SEGMENT (LMLSEG X LMTRSG) 00875100
ISN 0093            COMMON   TRNNLS                                                   00875200
                C    LINE SEGMENT BY TWICE THE NUMBER OF TRAINS IN A LINE SEGMENT      00875300
                C    (LMLSEG X 2*LMTRSG)                                               00875400
ISN 0094            COMMON   TRNDLS(90,16)                                            00875500
                C  VENTILATION SHAFT SEGMENT VARIABLES  ( LMVSEG )                     00875600
ISN 0095            COMMON   AGVS(60), AVS(60), EXVOVS, FDIRVS(60), FPMXVS(60)        00875700
ISN 0096            COMMON   FPMNVS(60), FTOFVS, FTONVS, FTYPVS, LVS, LVSS            00875800
ISN 0097            COMMON   NAMVS(60,9), MNFPVS(60), MXFPVS(60), NUMVS, REVS(60)     00875900
ISN 0098            COMMON   RNFVS(60), STAKVS(60), SURVSS(60), TABL5, TABL6, TYPVS   00876000
ISN 0099            COMMON   VOLVSS(60), VOMXVS(60)                                   00876100
                C  SUBSEGMENT VARIABLES (LINE AND VENT SHAFT SUBSEGMENT)  (LMSS)       00876200
ISN 0100            COMMON   DERHSS(300), DERTSS(300), EMTRSS(300), EMTFSS(300)       00876300
ISN 0101            COMMON   EMHPSS(300), EMHFSS(300), FBSS(300), FFSS(300)           00876400
ISN 0102            COMMON   FLOBSS(300), FLOFSS(300), HRMN(300), HRMX(300)           00876500
ISN 0103            COMMON   HSUMSS(300), HTRNSS(300), HTMPSS(300), HTSMSS(300)       00876600
ISN 0104            COMMON   HUMSS(300), LHLTSS, LSUMSS, MNHR(300), MNTDB(300)        00876700
ISN 0105            COMMON   MNTWB(300), MXHR(300), MXTDB(300), MXTWB(300)            00876800
ISN 0106            COMMON   QERHSS(300), QERTSS(300), QSMXSS(300), QSUMSS(300)       00876900
ISN 0107            COMMON   SHLTSS(300), SHRSS(300), SHUXSS(300), STDBSS(300)        00877000
ISN 0108            COMMON   STDNSS(300), STDPSS(300), STWBSS(300), TABL7, TDBSS(300) 00877100
ISN 0109            COMMON   TDBMN(300), TDBMX(300), TSFSS(300), TABL44, TTMPSS(300)  00877200
ISN 0110            COMMON   TWBSS(300), TWBMN(300), TWBMX(300), VOLSS(300)           00877300
                C  LINE SUBSEGMENT VARIABLES  (LMLSS)                                  00877400
ISN 0111            COMMON   EXOTDB, LACLSS, LHLSS, SACLSS(250), SHLSS(250)           00877500
                C    LINE SUBSEGMENT BY TRAIN ROUTE  (LMLSS X LMTRRT)                  00877600
ISN 0112            COMMON   ITNLSS                                                   00877700
                C  ZONE CLUSTER VARIABLES                                              00877800
ISN 0113            COMMON   TYPCL                                                    00877900
                C  SUBWAY VEHICLE TYPE VARIABLES  ( LMTRTP )                           00878000
ISN 0114            COMMON   ACACCV(3), ACCV(3), ACDECV(3), ARACCV(3), ARDECV(3)      00878100
ISN 0115            COMMON   AV(3), CDBVOV(3), CDFVOV(3), CHPR1V(3), CHPR2V(3)        00878200
ISN 0116            COMMON   COAMP(3,4), COAMPL(3,6), COATEV(3), COBTEV(3), CORMV(3,3)00878300
ISN 0117            COMMON   COTEV(3,4), DECAV(3), DECBV(3), DECV(3), DECV1V(3)       00878400
ISN 0118            COMMON   DIACGV(3), DIDCGV(3), EMISAG(3), EMISDG(3), LAMDAV, LHREV00878500
ISN 0119            COMMON   LV, MCPGAV, MCPGDV, MOTORV, NCARV, NOPTV(3), NPCARV      00878600
ISN 0120            COMMON   PERMV(3), PEGENV(3)                                      00878700
ISN 0121            COMMON   RE1M(3), RE2M(3), RE3M(3), RRACC(3), SHREV(3), SLOPEV(3) 00878800
ISN 0122            COMMON   SP1(3), SP2(3), SRE1M(3), SRE2M(3), TESP1(3)             00878900
ISN 0123            COMMON   TIACCV(3), TIDECV(3), UCHPRV(3), U2M(3), U3M(3), WV(3)   00879000
                C   UNDERPLATFORM EXHAUST VARIABLES                                    00879100
ISN 0124            COMMON   EFSUX, EFMUX, OPTUX, UMAXUX                              00879200
                C  ROUTE VARIABLES  ( LMTRRT )                                         00879300
ISN 0125            COMMON   COPTRT, NTSRT, ORIGRT(6), UMINRT(6)                      00879400
                C    DISPATCHER VARIABLES  ( LMTRRT ) AND ( LMTRGP X LMTRRT )          00879500
ISN 0126            COMMON   GRHDWY, GRTYPV, JGROUP, NGRV, NMTRGR, NTIMTR(6)          00879600
ISN 0127            COMMON   NTRGR, NUMBTR                                            00879700
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                C     TRACK SECTION VARIABLES  ( LMTSRT X LMTRRT )                    00879800
ISN 0128              COMMON   DWLTS, FSTS(260,6), GRDTS(260,6), NPETTS              00879900
ISN 0129              COMMON   NSEGTS, RADTS(260,6), UMXTS(260,6)                    00880000
                C     EXPLICIT TRAIN PERFORMANCE VARIABLES  ( LMEXPD X LMTPRT )      00880100
ISN 0130              COMMON   NEXPDP, QGRIDV(201,6), SPEEDV(201,6), TIMEV           00880200
                C  OPERATIONAL TRAIN VARIABLES  ( LMTRAN )                           00880300
ISN 0131              COMMON   AMPV(30), AMPLV(30), ANVV(30), DGRDDV(30), DPV, DRAGV(30)00880400
ISN 0132              COMMON   DUDTV(30), INDEX, IROTEV, ITYPV, MODEV, NTSV          00880500
ISN 0133              COMMON   NTSV2, QACCV(30), QDECV(30), QERACV(30), QERDCV(30)   00880600
ISN 0134              COMMON   QTRPF(30), RGSUMV(30), RMHTV(30), RSISTV(30), TAAVGV(30) 00880700
ISN 0135              COMMON   TEV(30), TGACCV(30), TGDECV(30), TLPSV, TNUMV, TSTRTV 00880800
ISN 0136              COMMON   TWAVGV(30), UV(30), WPATV(30), XLASTV(30), XV(30)     00880900
                C  FAN TYPE VARIABLES  ( LMFNTP )                                    00881000
ISN 0137              COMMON   CFMHFT(4), CFMLFT(4), FN1IFT(4), FN2IFT(4), FN3IFT(4) 00881100
ISN 0138              COMMON   FN4IFT(4), FN1OFT(4), FN2OFT(4), FN3OFT(4), FN4OFT(4) 00881200
ISN 0139              COMMON   TIMFT(4)                                              00881300
                C  UNSTEADY HEAT LOAD VARIABLES  ( LMUL )                            00881400
ISN 0140              COMMON   HLLUL(10), HLSUL(10), LSSUL, LTONUL(10), LTOFUL(10)   00881500
                C  PATRON CHARACTERISTICS                                            00881600
ISN 0141              COMMON   PATWHT                                                00881700
                C  PRINT GROUP VARIABLES  ( LMPRGP )                                 00881800
ISN 0142              COMMON   GINTPR, GRABBP, GRSUM, NPRGR                          00881900
                C                                                                    00882000
ISN 0143              EQUIVALENCE  (ND(1), NDS(2), NDSS(3))                          00882100
                C                                                                    00882200
                C                                                                    00882300
ISN 0144              QACC=0.0                                                       00882400
ISN 0145              QDEC=0.0                                                       00882500
                C*****COMPUTE THE ENERGY INPUT (IN BTU/SEC/ENTIRE TRAIN) TO THE TRAIN 00882600
                C*****CAUSED BY FORCES ACTING UPON IT                                00882700
ISN 0146              DELPE= -RSISTV(NUMV) * UV(NUMV) * FLBBTU                       00882800
                C*****FIND THE CHOPPER LOSS COEFFICIENT - IF ANY                     00882900
ISN 0147              IF ( UV(NUMV) - UCHPRV(ITYP) ) 12,12,11                        00883000
ISN 0148        11    CHOPER = CHPR2V(ITYP)                                          00883100
ISN 0149              GO TO 13                                                       00883200
ISN 0150        12    CHOPER = CHPR1V(ITYP)                                          00883300
ISN 0151        13    GO TO( 20, 600, 700 ), TPOPT                                   00883400
                C                                                                    00882500
                C*****IMPLICIT TRAIN PERFORMANCE                                     00883600
                C                                                                    00883700
ISN 0152           20 NUMY1=MODEV(NUMV)+1                                            00883800
ISN 0153              GO TO (200,200,300,400,400,202,300,300),NUMY1                  00883900
ISN 0154          200 IF(DELPE) 210,215,215                                          00884000
ISN 0155          202 IF(DELPE) 225,204,204                                          00884100
ISN 0156          204 IF( TE ) 220,225,225                                           00884200 ← C
ISN 0157          210 DELPE = 0.0                                                    00884300
ISN 0158          215 IF( TE ) 220,220,300                                           00884400
ISN 0159          220 QDEC = DELPE                                                   00884500
ISN 0160          225 AMPS = 0.0                                                     00884600
ISN 0161              AMPL = 0.0                                                     00884700
ISN 0162              GO TO 680                                                      00884800
                C*****TRAIN IS USING MOTORS - FIND MOTOR CIRCUIT RESISTANCE          00884900
ISN 0163          300 CALL RESIST( UV(NUMV), ITYP, OHMS )                            00885000
                C*****COMPUTE HEAT INPUT TO ACCELERATION RESISTOR GRIDS              00885100
ISN 0164              QACC=(AMPS**2*OHMS*MOTORV(ITYP)+AMPL*CHOPER*NCARV(ITYP))*WTBTUS 00885200
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ISN 0165          GO TO 680                                                  00885300
            C*****TRAIN IS BRAKING - FIND APPARENT MASS                      00885400
ISN 0166      400 TMASS = WV(ITYP)*BRACC(ITYP) + WPATV(NUMV)/GRACC           00885500
            C*****COMPUTE HEAT INPUT TO DECELERATION RESISTOR GRIDS          00885600
ISN 0167          QDEC = -TMASS * UV(NUMV) * DUDTV(NUMV) * FLBBTU + DELPE    00885700
ISN 0168          IF(QDEC) 420,680,680                                       00885800
ISN 0169      420 QDEC = 0.0                                                 00885900
ISN 0170          GO TO 680                                                  00886000
            C                                                                00886100
            C*****EXPLICIT TRAIN PERFORMANCE                                 00886200
            C                                                                00886300
ISN 0171      600 TMASS = WV(ITYP) * BRACC(ITYP) + WPATV(NUMV) /GRACC        00886400
ISN 0172          QDEC = -TMASS *UV(NUMV) * DUDTV(NUMV) * FLBBTU + DELPE     00886500
ISN 0173          IF( QDEC ) 610,620,620                                     00886600
ISN 0174      610 QDEC = 0.0                                                 00886700
ISN 0175      620 IF( TE ) 640,640,630                                       00886800
ISN 0176      630 CALL RESIST( UV(NUMV), ITYP, OHMS)                         00886900
ISN 0177          QACC=(AMPS**2*OHMS*MOTORV(ITYP)+AMPL*CHOPER*NCARV(ITYP))*WTBTUS 00887000
ISN 0178          GO TO 680                                                  00887100
ISN 0179      640 TE = 0.0                                                   00887200
ISN 0180          AMPS = 0.0                                                 00887300
ISN 0181          AMPL = 0.0                                                 00887400
            C*****INCORPORATE THE EFFECTS OF REGENERATIVE BRAKING            00887500
ISN 0182      680 QACCV(NUMV) = QACC                                         00887600
ISN 0183          QDECV(NUMV) = QDEC * REGENV(ITYP)                          00887700
ISN 0184      700 RETURN                                                     00887800
ISN 0185          END                                                        00887900
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II. Revision No. 2

SUBWAY ENVIRONMENT SIMULATION (SES) COMPUTER PROGRAM

REVISION NO. 2 TO VERSION 2

Problem

The average value for relative humidity was being reported incorrectly for subsegments other than the first subsegment in each line segment or ventilation shaft.

Symptoms

In some cases, an unreasonable value for the average relative humidity was being reported. In addition, the columns of numbers were not aligned in the output.

Correction

See attached corrected listing of subroutine SUMARY. Corrected lines are indicated by a "C."

Effect on Previous Results

The correct value of average relative humidity may be calculated from the incorrect value which was reported for the second thru last subsegment in a line segment or ventilation shaft by multiplying the incorrect value by the following quantity:

$$\frac{100 \times \begin{pmatrix}\text{Time Interval Per}\\ \text{Cycle, in Seconds}\end{pmatrix} \times \begin{pmatrix}\text{Number of Cycles Per}\\ \text{Thermodynamic Evaluation}\end{pmatrix}}{\begin{pmatrix}\text{Time between Previous Summary and}\\ \text{This Summary, in Seconds}\end{pmatrix}}$$

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          COMPILER OPTIONS - NAME=  MAIN,OPT=02,LINECNT=57,SIZE=0000K,
                             SOURCE,EBCDIC,NOLIST,NODECK,LOAD,MAP,NOEDIT,ID,NOXREF
 ISN 0002            SUBROUTINE SUMARY (IOPT)                                    02385600
                 C                                                               02385700
                 C                                                               02385800
                 C     IOPT = 0   NO SUMMARY, DON'T INITIALIZE                   02385900
                 C            1   INITIALIZE ONLY                                02386000
                 C            2   PRINT SUMMARY ONLY                             02386100
                 C            3   PRINT SUMMARY AND INITIALIZE                   02386200
                 C            4   PRINT SUMMARY,PERF. ENVIRON. LOAD ESTIMATE, INITIALIZE02386300
                 C                                                               02386400
                 C                                                               02386500
 ISN 0003            REAL  DUMMY1(6), SUMQ(3)                                    02386600
                 C                                                               02386700
                 C     INCLUDE  DSHARE                                           02386800
                 C                                                               02386900
                 C ************************ INTEGER VARIABLES ************************ C02387000
                 C                                                               02387100
                 C  GENERAL VARIABLES                                            02387200
 ISN 0004            INTEGER   AETIME, BLANK, BLPREQ, DATE(8), DEATH, DESPER, FSCFT  02387300
 ISN 0005            INTEGER   HCOPT, HSOPT, HUMOPT, OUT, PRTIME, SLASH, SUPOPT  02387400
 ISN 0006            INTEGER   SYSTEM(18), THOPT, THTIME, TNLSS, TNSS, TPOPT, TRTIME  02387500
                 C  SECTION VARIABLES  (LMSECT)                                  02387600
 ISN 0007            INTEGER   NTOPS(140)                                        02387700
 ISN 0008            INTEGER   TABL9(140), TABL10(140), TABL11(140), TABL12(140)  02387800
 ISN 0009            INTEGER   TABL13(140), TABL20(140), TABL21(140)             02387900
                 C    SECTION (LMSECT), SECTION+ONE  (LMSECT+1) ,  SECTION+TWO (LMSECT+2)02388000
 ISN 0010            INTEGER   ND(140), NDS(141), NDSS(142)                      02388100
                 C    SECTION * ESTIMATED AVERAGE OF 3 LOOPS THROUGH SECTION ( LMLPK )  02388200
 ISN 0011            INTEGER   LKAN(420)                                         02388300
                 C    SECTION EXTERNAL IDENTIFICATION NUMBERS (LMSCTX)           02388400
 ISN 0012            INTEGER   TABL14(400)                                       02388500
                 C  NODE VARIABLES  (LMNODE)                                     02388600
 ISN 0013            INTEGER   TABL1(132), TABL15(130), TABL16(130), TABL22(130) 02388700
 ISN 0014            INTEGER   TABL23(132), TABL45(130), TYPTND(130)             02388800
                 C  AERODYNAMIC NODE VARIABLES (LMTBL2)                          02388900
 ISN 0015            INTEGER   TABL2(1500)                                       02389000
                 C    NODES BY NUMBER OF SECTIONS CONNECTED TO NODE (LMNODE X LMSCND)  02389100
 ISN 0016            INTEGER   TABL17(130,5), TABL18(130,5)                      02389200
                 C    NODE EXTERNAL IDENTIFICATION NUMBERS (LMSCTX)              02389300
 ISN 0017            INTEGER   TABL19(400)                                       02389400
                 C  LOOP VARIABLES  (LMNLOP)                                     02389500
                 C  LINE SEGMENT VARIABLES  (LMLSEG)                             02389600
 ISN 0018            INTEGER   NTRNLS(90), NUMLS(90), TABL3(90), TABL4(90), TABL8(90)  02389700
 ISN 0019            INTEGER   TYPLS(90)                                         02389800
                 C    LINE SEGMENT BY NUMBER OF TRAINS IN SEGMENT  (LMLSEG X LMTRSG)  02389900
 ISN 0020            INTEGER   TRNNLS(90,8)                                      02390000
                 C  VENTILATION SHAFT SEGMENT VARIABLES    ( LMVSEG )            02390100
 ISN 0021            INTEGER   FTOFVS(60), FTONVS(60), NUMVS(60)                 02390200
 ISN 0022            INTEGER   TABL6(60), TYPVS(60), EXVOVS(60), FTYPVS(60), TABL5(60) 02390300
                 C  SUBSEGMENT VARIABLES  (LMSS)                                 02390400
 ISN 0023            INTEGER   TABL7(300), TABL44(300)                           02390500
                 C  LINE SUBSEGMENT VARIABLES   ( LMLSS X TABLE SIZE )           02390600
 ISN 0024            INTEGER   EXOTD8(250,6)                                     02390700
                 C    LINE SUBSEGMENT BY TRAIN ROUTE ( LMLSS X LMTRRT )          02390800
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ISN 0025          INTEGER   ITNLSS(250,6)                                  02390900
            C  HEATING OR COOLING ZONE CLUSTER VARIABLES  (LMCLST)          02391000
ISN 0026          INTEGER   TYPCL(30)                                       02391100
            C  SUBWAY VEHICLE TYPE VARIABLES  (LMTRTP)                      02391200
ISN 0027          INTEGER   NCARV(3), NPCARV(3)                             02391300
            C  UNDERPLATFORM EXHAUST VARIABLES                              02391400
ISN 0028          INTEGER   OPTUX                                           02391500
            C  ROUTE VARIABLES  (LMTRRT)                                    02391600
ISN 0029          INTEGER   COPTRT(6), NTSRT(6)                             02391700
            C    DISPATCHER VARIABLES (LMTRRT) AND (LMTRGP X LMTRRT)        02391800
ISN 0030          INTEGER   GRTYPV(15,6), JGROUP(6), NGRV(6), NMTRGR(6)     02391900
ISN 0031          INTEGER   NTRGR(15,6)                                     02392000
ISN 0032          INTEGER   GRHDWY(15,6)                                    02392100
            C    TRACK SECTION VARIABLES  (LMTSRT X LMTRRT)                 02392200
ISN 0033          INTEGER   DWLTS(260,6)                                    02392300
ISN 0034          INTEGER   NPETTS(260,6), NSEGTS(260,6)                    02392400
            C    EXPLICIT TRAIN PERFORMANCE VARIABLES  (LMEXPD X LMTRRT)    02392500
ISN 0035          INTEGER   NEXPOP(6)                                       02392600
ISN 0036          INTEGER   TIMEV(201,6)                                    02392700
            C  OPERATIONAL TRAIN VARIABLES  (LMTRAN)                        02392800
ISN 0037          INTEGER   DPV(30), INDEX(30), IROTEV(30), ITYPV(30), MODEV(30)  02392900
ISN 0038          INTEGER   NTSV(30), NTSV2(30), TNUMV(30)                  02393000
ISN 0039          INTEGER   TLPSV(30), TSTRTV(30)                           02393100
            C  FAN TYPE VARIABLES  (LMFNTP)                                 02393200
            C  UNSTEADY HEAT LOAD VARIABLES  ( LMUL )                       02393300
ISN 0040          INTEGER   LSSUL(10)                                       02393400
            C  PRINT GROUP VARIABLES  ( LMPRGP )                            02393500
ISN 0041          INTEGER   GINTPR(15), GRABBP(15), GRSUM(15), NPRGR(15)    02393600
            C                                                               02393700
            C ************************* REAL VARIABLES ************************* C02393800
            C                                                               02393900
            C  GENERAL VARIABLES                                            02394000
ISN 0042          REAL      NUAIR, MPHFPS                                   02394100
            C  SECTION VARIABLES                                            02394200
            C  NODE VARIABLES                                               02394300
            C  LOOP VARIABLES                                               02394400
            C  LINE SEGMENT VARIABLES                                       02394500
ISN 0043          REAL      LLS(90), LLSS(90)                               02394600
            C  VENTILATION SHAFT SEGMENT VARIABLES                          02394700
ISN 0044          REAL      LVS(60), LVSS(60)                               02394800
            C  SUBSEGMENT VARIABLES                                         02394900
ISN 0045          REAL      LHLTSS(300), LSUMSS(300)                        02395000
            C  LINE SUBSEGMENT VARIABLES                                    02395100
ISN 0046          REAL      LACLSS(250), LHLSS(250)                         02395200
            C  ZONE VARIABLES                                               02395300
            C  SUBWAY VEHICLE TYPE VARIABLES                                02395400
ISN 0047          REAL      LAMDAV(3), LHREV(3), LV(3), MCPGAV(3), MCPGDV(3)  02395500
ISN 0048          REAL      MOTORV(3)                                       02395600
            C  ROUTE VARIABLES                                              02395700
            C    DISPATCHER VARIABLES                                       02395800
            C    TRACK SECTION VARIABLES                                    02395900
            C    EXPLICIT TRAIN PERFORMANCE VARIABLES                       02396000
            C  OPERATIONAL TRAIN VARIABLES                                  02396100
            C  FAN TYPE VARIABLES                                           02396200
            C  PRINT GROUP VARIABLES                                        02396300
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                C                                                                       02396400
                C ****************************** COMMON ******************************** C02396500
                C                                                                       02396600
                C GENERAL VARIABLES                                                     02396700
ISN 0049              COMMON   AFTIME, ANNAMP, BLANK, BLPREC, DATE, DEATH               02396800
ISN 0050              COMMON   DELAE, DELP, DELT, DELTH, DELTR, DEL2TH, DESPER, FSCFT   02396900
ISN 0051              COMMON   HCOPT, HMAMBE, HMAMBM, HOUR, HSOPT, HUMAMB, HUMOPT       02397000
ISN 0052              COMMON   IEQUAT, IN, INODE, IPRGRP, ISITU, JRATAF, JRATTH, JRATTR 02397100
ISN 0053              COMMON   KAERO, KASTEP, KBND1, KBND2, KBND3, KPRNTH, KTSTEP, LIFE 02397200
ISN 0054              COMMON   LINES, MAXTIM, MONTH, MXMNPT, NBR, NBRJCT, NCLUST, NDELT 02397300
ISN 0055              COMMON   NDTYPA, NEW, NFNTYP, NLCOP, NLS, NLSCPL, NLSEC, NNODE    02397400
ISN 0056              COMMON   NOSUMY, NOSYS, NOTRAN, NPGRP, NPORTL, NSEC, NSIMER       02397500
ISN 0057              COMMON   NTIME, NTNCDE, NTRAN, NTRRTE, NTRTYP, NUMUL, NVSEC       02397600
ISN 0058              COMMON   NZONE, OUT, PAMB, PRTIME, SLASH                          02397700
ISN 0059              COMMON   SUMTST, SUPOPT, SYSTEM, TAMBA, TAMBM, TDBAMB             02397800
ISN 0060              COMMON   THOPT, THTIME, TNLSS, TNSS, TPOPT, TRTIME, TWBAMB, TWAMBE02397900
ISN 0061              COMMON   TWAMBM, WNTSUM                                           02398000
                C  ARRAY SIZE LIMITS                                                    02398100
ISN 0062              COMMON   LMBLP,LMCLST,LMCOND,LMEQRM, LMEXPD, LMFNTP, LMLPK, LMLPLK02398200
ISN 0063              COMMON   LMLSEG, LMLSS, LMNLOP, LMNODE, LMNODX, LMPRGP, LMSCND    02398300
ISN 0064              COMMON   LMSCTX, LMSECT, LMSS, LMSSTN, LMTBL2, LMTHND, LMTRAN     02398400
ISN 0065              COMMON   LMTRGP, LMTRRT, LMTRSG, LMTRTP, LMTSRT, LMUL, LMVSEG     02398500
                C  PHYSICAL CONSTANTS                                                   02398600
ISN 0066              COMMON   ABTEMP, BTUFLB, CP, FLBBTU, FLBHP, FPSMPH, FTIN, GRACC  02398700
ISN 0067              COMMON   HVH2O, MPHFPS, NUAIR, PI, PR, RDRYAR, RHOCP, RHOMAS     02398800
ISN 0068              COMMON   RHOWHT, SAINHG, SAPSI, STEFAN, THCON, TONLB, VISAIR      02398900
ISN 0069              COMMON   WGCONS, WTBTUS                                           02399000
                C  SECTION VARIABLES  ( LMSECT )                                        02399100
ISN 0070              COMMON   AHIGHS(140), ALOWS(140), BCS(140), BS(140), CEPS(140)    02399200
ISN 0071              COMMON   CENS(140), DQDTS(140), MNQS(140), MXQS(140), NTQPS       02399300
ISN 0072              COMMON   OMEGS(140), QS(140), QSAVES(140), QSMX(140), QSMN(140)   02399400
ISN 0073              COMMON   SUMQNS(140), SUMQPS(140), TABL9, TABL10, TABL11, TABL12  02399500
ISN 0074              COMMON   TABL13, TABL20, TABL21, VHIGHS(140), VLOWS(140)          02399600
                C    SECTION + TWO  (LMSECT+2)                                          02399700
ISN 0075              COMMON   NDSS                                                    02399800
                C    SECTION * ESTIMATED AVERAGE OF 3 LOOPS THROUGH SECTION ( LMLPLK )  02399900
ISN 0076              COMMON   LKAN                                                    02400000
                C    SECTION EXTERNAL IDENTIFICATION NUMBERS                            02400100
ISN 0077              COMMON   TABL14                                                  02400200
                C  NODE VARIABLES  ( LMNODE )                                           02400300
ISN 0078              COMMON   TABL1, TABL15, TABL16, TABL17, TABL18, TABL22, TABL23    02400400
ISN 0079              COMMON   TABL45, TYPIND                                          02400500
                C    NODE EXTERNAL IDENTIFICATION NUMBERS                               02400600
ISN 0080              COMMON   TABL19                                                  02400700
                C  AERODYNAMIC NODE VARIABLES  (LMTBL2)                                 02400800
ISN 0081              COMMON   TABL2                                                   02400900
                C  AERODYNAMIC JUNCTION COEFFICIENTS ( LMCOND )                         02401000
ISN 0082              COMMON   COAEND(950)                                             02401100
                C  THERMODYNAMIC NODE VARIABLES  ( LMTHND )                             02401200
ISN 0083              COMMON   HAVGTN(140), HGMTN(140), TAVGTN(140), TDBTN(140)        02401300
                C    THERMODYNAMIC NODES BY NUMBER OF SECTIONS CONNECTED TO A NODE      02401400
                C    ( LMTHND X LMSCND )                                                02401500
ISN 0084              COMMON   EMHBTN(140,5), EMTBTN(140,5), FLOBTN(140,5)             02401600
                C  LOOP VARIABLES  ( LMNLOP )                                           02401700
ISN 0085              COMMON   DQDTLP(75), CMEGLP(75), QERRLP(75), QLP(75)             02401800
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                C  AERODYNAMIC MATRIX OF COEFFICIENTS - ARRAY SIZE ESTIMATED AT          02401900
                C  APPROXIMENTLY 0.05*LMSECT**2  (LMBLP)                                 02402000
ISN 0086            COMMON   BLP(1000)                                                   02402100
                C  LINE SEGMENT VARIABLES  ( LMLSEG )                                    02402200
ISN 0087            COMMON   ALS(90), CILS(90), CBNLS(90), CBPLS(90), CFNLS(90)          02402300
ISN 0088            COMMON   CFPLS(90), DBTLS(90), DTDFLS(90), DTDNLS(90), DTHELS(90)    02402400
ISN 0089            COMMON   DTHMLS(90), DTWELS(90), DTWMLS(90), EPSLS(90), FFFLS(90)    02402500
ISN 0090            COMMON   FLS(90), LLS, LLSS, NAMLS(90,9), NTRNLS, NUMLS              02402600
ISN 0091            COMMON   PDPYLS(90), PERMLS(90), RELS(90), RNFLS(90), RPRMLS(90)     02402700
ISN 0092            COMMON   SURLSS(90), TABL3, TABL4, TABL8, THCNLS(2,90)               02402800
ISN 0093            COMMON   THDFLS(2,90), TSNKLS(90), TYPLS, VOLLSS(90)                 02402900
                C    LINE SEGMENT BY NUMBER OF TRAINS IN LINE SEGMENT (LMLSEG X LMTRSG)  02403000
ISN 0094            COMMON   TRNNLS                                                      02403100
                C    LINE SEGMENT BY TWICE THE NUMBER OF TRAINS IN A LINE SEGMENT        02403200
                C    (LMLSEG X 2*LMTRSG)                                                 02403300
ISN 0095            COMMON   TRNDLS(90,16)                                               02403400
                C  VENTILATION SHAFT SEGMENT VARIABLES  ( LMVSEG )                       02403500
ISN 0096            COMMON   AGVS(60), AVS(60), EXVOVS, FDIRVS(60), FPMXVS(60)           02403600
ISN 0097            COMMON   FPMNVS(60), FTDFVS, FTDNVS, FTYPVS, LVS, LVSS               02403700
ISN 0098            COMMON   NAMVS(60,9), MNFPVS(60), MXFPVS(60), NUMVS, REVS(60)         02403800
ISN 0099            COMMON   RNFVS(60), STAKVS(60), SURVSS(60), TABL5, TABL6, TYPVS       02403900
ISN 0100            COMMON   VOLVSS(60), VOMXVS(60)                                      02404000
                C  SUBSEGMENT VARIABLES (LINE AND VENT SHAFT SUBSEGMENT)  (LMSS)         02404100
ISN 0101            COMMON   DERHSS(300), DERTSS(300), EMTBSS(300), EMTFSS(300)          02404200
ISN 0102            COMMON   EMHBSS(300), EMHFSS(300), FBSS(300), FFSS(300)              02404300
ISN 0103            COMMON   FLOBSS(300), FLOFSS(300), HRMN(300), HRMX(300)              02404400
ISN 0104            COMMON   HSUMSS(300), HTPNSS(300), HTMPSS(300), HTSMSS(300)          02404500
ISN 0105            COMMON   HUMSS(300), LHLTSS, LSUMSS, MNHR(300), MNTDB(300)           02404600
ISN 0106            COMMON   MNTWB(300), MXHR(300), MXTDB(300), MXTWB(300)               02404700
ISN 0107            COMMON   QERHSS(300), QERTSS(300), QSMXSS(300), QSUMSS(300)          02404800
ISN 0108            COMMON   SHLTSS(300), SHRSS(300), SHUXSS(300), STDBSS(300)           02404900
ISN 0109            COMMON   STDNSS(300), STDPSS(300), STWBSS(300), TABL7, TDBSS(300)    02405000
ISN 0110            COMMON   TDBMN(300), TDBMX(300), TSFSS(300), TABL44, TTMPSS(300)     02405100
ISN 0111            COMMON   TWBSS(300), TWBMN(300), TWBMX(300), VOLSS(300)              02405200
                C  LINE SUBSEGMENT VARIABLES  (LMLSS)                                    02405300
ISN 0112            COMMON   EXDTDB, LACLSS, LHLSS, SACLSS(250), SHLSS(250)              02405400
                C    LINE SUBSEGMENT BY TRAIN ROUTE  (LMLSS X LMTRRT)                    02405500
ISN 0113            COMMON   ITNLSS                                                      02405600
                C  ZONE CLUSTER VARIABLES                                                02405700
ISN 0114            COMMON   TYPCL                                                       02405800
                C  SUBWAY VEHICLE TYPE VARIABLES  ( LMTRTP )                             02405900
ISN 0115            COMMON   ACACCV(3), ACCV(3), ACDECV(3), ARACCV(3), ARDECV(3)         02406000
ISN 0116            COMMON   AV(3), CDRVOV(3), CDFVOV(3), CHPR1V(3), CHPR2V(3)           02406100
ISN 0117            COMMON   COAMP(3,4), COAMPL(3,6), COATEV(3), CCBTEV(3), CORMV(3,3)02406200
ISN 0118            COMMON   CDTEV(3,4), DECAV(3), DECBV(3), DECV(3), DECV1V(3)          02406300
ISN 0119            COMMON   DIACGV(3), DIDCGV(3), EMISAG(3), EMISDG(3), LAMDAV, LHREV02406400
ISN 0120            COMMON   LV, MCPGAV, MCPGDV, MOTORV, NCARV, NOPTV(3), NPCARV         02406500
ISN 0121            COMMON   PERMV(3), REGENV(3)                                         02406600
ISN 0122            COMMON   RE1M(3), RE2M(3), RE3M(3), RRACC(3), SHREV(3), SLOPEV(3)    02406700
ISN 0123            COMMON   SP1(3), SP2(3), SRE1M(3), SRE2M(3), TFSP1(3)                02406800
ISN 0124            COMMON   TIACCV(3), TIDECV(3), UCHPRV(3), U2M(3), U3M(3), WV(3)       02406900
                C   UNDERPLATFORM EXHAUST VARIABLES                                      02407000
ISN 0125            COMMON   EFSUX, EFMUX, OPTUX, UMAXUX                                 02407100
                C  ROUTE VARIABLES  ( LMTRRT )                                           02407200
ISN 0126            COMMON   COPTRT, NTSRT, CRIGRT(6), UMINRT(6)                         02407300
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                C     DISPATCHER VARIABLES  ( LMTRRT ) AND ( LMTRGP X LMTRRT )
ISN 0127              COMMON   GRHOWY, GRTYPV, JGROUP, NGRV, NMTRGR, NTIMTR(6)
ISN 0128              COMMON   NTRGR, NUMBTR
                C     TRACK SECTION VARIABLES  ( LMTSRT X LMTRRT )
ISN 0129              COMMON   DWLTS, FSTS(260,6), GRDTS(260,6), NPETTS
ISN 0130              COMMON   NSEGTS, RADTS(260,6), UMXTS(260,6)
                C     EXPLICIT TRAIN PERFORMANCE VARIABLES  ( LMEXPD X LMTRRT )
ISN 0131              COMMON   NEXPDP, QGRIDV(201,6), SPFEDV(201,6), TIMEV
                C  OPERATIONAL TRAIN VARIABLES  ( LMTRAN )
ISN 0132              COMMON   AMPV(30), AMPLV(30), ANVV(30), DGRDQV(30), DPV, DRAGV(30)
ISN 0133              COMMON   DUDTV(30), INDEX, IROTEV, ITYPV, MODEV, NTSV
ISN 0134              COMMON   NTSV2, QACCV(30), QDECV(30), QERACV(30), QERDCV(30)
ISN 0135              COMMON   QTRPF(30), RGSUMV(30), RMHTV(30), RSISTV(30), TAAVGV(30)
ISN 0136              COMMON   TEV(30), TGACCV(30), TGDECV(30), TLPSV, TNUMV, TSTRTV
ISN 0137              COMMON   TWAVGV(30), UV(30), WPATV(30), XLASTV(30), XV(30)
                C  FAN TYPE VARIABLES  ( LMFNTP )
ISN 0138              COMMON   CFMHFT(4), CFMLFT(4), FN1IFT(4), FN2IFT(4), FN3IFT(4)
ISN 0139              COMMON   FN4IFT(4), FN1OFT(4), FN2OFT(4), FN3OFT(4), FN4OFT(4)
ISN 0140              COMMON   TIMFT(4)
                C  UNSTEADY HEAT LOAD VARIABLES  ( LMUL )
ISN 0141              COMMON   HLLUL(10), HLSUL(10), LSSUL, LTONUL(10), LTOFUL(10)
                C  PATRON CHARACTERISTICS
ISN 0142              COMMON   PATWHT
                C  PRINT GROUP VARIABLES  ( LMPRGP )
ISN 0143              COMMON   GINTPR, GRABBP, GRSUM, NPRGR
                C
ISN 0144              EQUIVALENCE  (ND(1), NDS(2), NDSS(3))
                C
                C
                C
ISN 0145              IF (IOPT) 2000,2000,10
ISN 0146        10    IF (IOPT-2) 990,20,20
                C
ISN 0147        20    TIME=FLOAT(NTIME)/100.0
ISN 0148              DO 685 ISCTX=1,LMSCTX
ISN 0149              IF (TABL14(ISCTX)) 685,685,30
ISN 0150        30    ISCT=TABL14(ISCTX)
ISN 0151              ISEGL=TABL9(ISCT)
ISN 0152              ISEGH=TABL10(ISCT)
ISN 0153              NODEB=TABL12(ISCT)
ISN 0154              NODEF=TABL13(ISCT)
                C
ISN 0155              IF (ISEGL) 40,50,50
                C---- VENTILATION SHAFT SECTION
ISN 0156        40    IVS=-ISEGL
ISN 0157              ISEGL=IVS
ISN 0158              ISEGH=IVS
ISN 0159              ISEGX=NUMVS(IVS)
ISN 0160              GO TO 60
ISN 0161        50    IVS=0
                C
ISN 0162        60    DO 630 ILS=ISEGL,ISEGH
                C
ISN 0163              WRITE (OUT,70) DATE,SYSTEM
ISN 0164        70    FORMAT (1H1,8A1,6X,'  SES   ',7X,18A4,9X,'PAGE'/115X,'------')
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ISN 0165          WRITE (OUT,80) SUMTST,TIME                                  02412900
ISN 0166     80   FORMAT (1H0,T34,'SUMMARY OF SIMULATION FROM',F8.2,' TO',F8.2,' SEC02413000
                 1ONDS')                                                       02413100
             C                                                                 02413200
ISN 0167          IF (IVS) 140,140,90                                          02413300
             C---- VENTILATION SHAFT                                           02413400
ISN 0168     90   IDUMY=TYPVS(IVS)                                             02413500
ISN 0169          GO TO (100,120), IDUMY                                       02413600
ISN 0170    100   WRITE (OUT,110) (NAMVS(IVS,J),J=1,9),TABL15(NODEB),TABL15(NODEF)  02413700
ISN 0171    110   FORMAT (1H0,'( VENTILATION SHAFT )',T43,9A4,T97,'FROM NODE',I3,' T02413800
                 1O NODE',I3)                                                  02413900
ISN 0172          GO TO 135                                                    02414000
ISN 0173    120   WRITE (OUT,130) (NAMVS(IVS,J),J=1,9),TABL15(NODEB),TABL15(NODEF)  02414100
ISN 0174    130   FORMAT (1H0,'( STAIRWAY )',T43,9A4,T97,'FROM NODE',I3,' TO NODE',I02414200
                 13)                                                           02414300
ISN 0175    135   WRITE(OUT,220)  LVS(IVS), AVS(IVS)                           02414400
ISN 0176          GO TO 225                                                    02414500
             C---- LINE SEGMENTS                                               02414600
ISN 0177    140   ISEGX = NUMLS(ILS)                                           02414700
ISN 0178          IDUMY=TYPLS(ILS)                                             02414800
ISN 0179          GO TO (150,170,190), IDUMY                                   02414900
ISN 0180    150   WRITE (OUT,160) (NAMLS(ILS,J),J=1,9),TABL15(NODEB),TABL15(NODEF)  02415000
ISN 0181    160   FORMAT (1H0,' (TUNNEL)',T43,9A4,T97,'FROM NODE',I3,' TO NODE',I3) 02415100
ISN 0182          GO TO 210                                                    02415200
ISN 0183    170   WRITE (OUT,180) (NAMLS(ILS,J),J=1,9),TABL15(NODEB),TABL15(NODEF)  02415300
ISN 0184    180   FORMAT (1H0,' (STATION)',T43,9A4,T97,'FROM NODE',I3,' TO NODE',I3)02415400
ISN 0185          GO TO 210                                                    02415500
ISN 0186    190   WRITE (OUT,200) (NAMLS(ILS,J),J=1,9),TABL15(NODEB),TABL15(NODEF)  02415600
ISN 0187    200   FORMAT (1H0,T34,9A4,T97,'FROM NODE',I3,' TO NODE',I3)        02415700
             C                                                                 02415800
ISN 0188    210   WRITE (OUT,220)  LLS(ILS), ALS(ILS)                          02415900
ISN 0189    220   FORMAT(1H0,' LENGTH',F8.1,' FT'/'  AREA',F10.1,' SQ FT',T54,'M  A 02416000
                 1 X  I  M  U  M',T80,'M  I  N  I  M  U  M',T106,'A V E R A G E'/T4102416100
                 2,'SYSTEM',T54,19('-'),T80,19('-'),T105,15('-') /             02416200
                 3     T38,'PARTITIONING',T56,'VALUE',T67,                    02416300
                 4   'TIME',T82,'VALUE',T93,'TIME',T110,'VALUE'/T38,12('-'),T54,9('-02416400
                 5'),T66,7('-'),T80,9('-'),T92,7('-'),T109,7('-')/T102,'POSITIVE',T102416500
                 614,'NEGATIVE'/T102,8('-'),T114,8('-'))                       02416600
ISN 0190    225   AVGP=SUMQPS(ISCT)*60.0/MXMNPT                                02416700
ISN 0191          AVGN=SUMQNS(ISCT)*60.0/MXMNPT                                02416800
ISN 0192          DUMY3=QSMX(ISCT)*60.0                                        02416900
ISN 0193          DUMY4=QSMN(ISCT)*60.0                                        02417000
ISN 0194          DUMY1=MXQS(ISCT)/100.0                                       02417100
ISN 0195          DUMY2=MNQS(ISCT)/100.0                                       02417200
ISN 0196          WRITE (OUT,230) ISCTX,ISEGX,DUMY3,DUMY1,DUMY4,DUMY2,AVGP,AVGN  02417300
ISN 0197    230   FORMAT (1H0,' AIR FLOW RATE',T25,'( CFM )',T37,I3,' -',I3,F17.0,F102417400
                 11.1,F15.0,F11.1,F11.0,F12.0)                                 02417500
ISN 0198          IF (IVS) 240,240,250                                         02417600
ISN 0199    240   A=ALS(ILS)                                                   02417700
ISN 0200          GO TO 260                                                    02417800
ISN 0201    250   A=AVS(IVS)                                                   02417900
ISN 0202    260   DUMY3=DUMY3/A                                                02418000
ISN 0203          DUMY4=DUMY4/A                                                02418100
ISN 0204          AVGP = AVGP / A                                              02418200
ISN 0205          AVGN = AVGN / A                                              02418300
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ISN 0206          WRITE (OUT,270) ISCTX,ISEGX,DUMY3,DUMY1,DUMY4,DUMY2,AVGP,AVGN      02418400
ISN 0207     270  FORMAT (1H0,' AIR VELOCITY',T25,'( FPM )',T37,I3,' -',I3,F17.0,F110241850 0
                 1.1,F15.0,F11.1,F11.0,F12.0)                                         02418600
ISN 0208          DUMY1=(100.0*NTOPS(ISCT))/MXMNPT                                   02418700
ISN 0209          DUMY2 = 100.0 - DUMY1                                              02418800
ISN 0210          WRITE(OUT,275) ISCTX,ISEGX,DUMY1,DUMY2                             02418900
ISN 0211      275 FORMAT(1H0,' AIR FLOW DIRECTION',T25,'( PERCENT )',T37,I3,' -',I3,02419000
                 1  54X,F11.1,F12.1 )                                                02419100
ISN 0212          IF (IVS) 280,280,290                                               02419200
              C---- LINE SEGMENT                                                     02419300
ISN 0213     280  ISSL=TABL3(ILS)                                                    02419400
ISN 0214          ISSH=TABL4(ILS)                                                    02419500
ISN 0215          GO TO 330                                                          02419600
              C---- VENTILATION SHAFT                                                02419700
ISN 0216     290  ISSL=TABL5(IVS)                                                    02419800
ISN 0217          ISSH=TABL6(IVS)                                                    02419900
ISN 0218          DUMY1=(100.0*EXVOVS(IVS))/MXMNPT                                   02420000
ISN 0219          DUMY2=VOMXVS(IVS)*60.0                                             02420100
ISN 0220          WRITE (OUT,300) DUMY2,ISCTX,ISEGX,DUMY1                            02420200
ISN 0221     300  FORMAT (1H0,' PERCENTAGE OF TIME OUTFLOW VELOCITY'/5X,'EXCEEDS',F802420300
                 1.1,' FPM',T37,I3,' -',I3,T98,F18.1)                               02420400
ISN 0222          DUMY2=MXFPVS(IVS)/100.0                                            02420500
ISN 0223          DUMY4=MNFPVS(IVS)/100.0                                            02420600
              C*****REMAINING CALCULATIONS FOR MAXIMUM AND MINIMUM                  02420700
              C*****STRAIGHT-THROUGH VENTILATION SHAFT PRESSURES (ABOVE             02420800
              C*****AND BELOW AMBIENT) TO BE INSERTED HERE                          02420900
              C                                                                     02421000
              C***** SKIP TEMPERATURE AND HUMIDITY SUMMARY IF THERMO NOT RUNNING    02421100
ISN 0224     330  IF (JRATTH) 680,680,340                                            02421200
ISN 0225     340  DUMY1=MXTDB(ISSL)/100.0                                            02421300
ISN 0226          DUMY2=MNTDB(ISSL)/100.0                                            02421400
ISN 0227          IF( NTOPS(ISCT) ) 342,342,343                                      02421500
ISN 0228      342 AVGP = 0.0                                                         02421600
ISN 0229          GO TO 344                                                          02421700
ISN 0230      343 AVGP=STDPSS(ISSL)/NTOPS(ISCT)                                      02421800
ISN 0231      344 IF( MXMNPT - NTOPS(ISCT)) 345,345,346                              02421900
ISN 0232      345 AVGN = 0.0                                                         02422000
ISN 0233          GO TO 347                                                          02422100
ISN 0234      346 AVGN=STDNSS(ISSL)/(MXMNPT-NTOPS(ISCT))                             02422200
ISN 0235      347 J=1                                                                02422300
ISN 0236          WRITE (OUT,350) ISCTX,ISEGX,J,TDBMX(ISSL),DUMY1,TDBMN(ISSL),DUMY2,02422400
                 1AVGP,AVGN                                                          02422500
ISN 0237     350  FORMAT (1H0,' DRY-BULB TEMPERATURE',T25,'( DEG F )',T37,2(I3,' -')02422600
                 1,I3,F12.1,F11.1,F15.1,F11.1,F11.1,F12.1)                           02422700
ISN 0238          J3=ISSH-ISSL+1                                                     02422800
ISN 0239          J2=ISSL-1                                                          02422900
ISN 0240          IF (J3-2) 390,360,360                                              02423000
ISN 0241     360  DO 370 J=2,J3                                                      02423100
ISN 0242          DUMY1=MXTDB(J2+J)/100.0                                            02423200
ISN 0243          DUMY2=MNTDB(J2+J)/100.0                                            02423300
ISN 0244          IF( NTOPS(ISCT) ) 362,362,363                                      02423400
ISN 0245      362 AVGP = 0.0                                                         02423500
ISN 0246          GO TO 364                                                          02423600
ISN 0247      363 AVGP=STDPSS(J2+J)/NTOPS(ISCT)                                      02423700
ISN 0248      364 IF( MXMNPT - NTOPS(ISCT) ) 365,365,366                             02423800
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ISN 0249        365 AVGN = C.0                                                  02423900
ISN 0250            GO TO 37C                                                   02424000
ISN 0251        366 AVGN=STDNSS(J2+J)/(MXMNPT-NTQPS(ISCT))                      02424100
ISN 0252      370   WRITE (OUT,380) ISCTX,ISEGX,J,TDBMX(J2+J),DUMY1,TDBMN(J2+J),DUMY2,02424200
                  1 AVGP,AVGN                                                   02424300
ISN 0253      380   FORMAT (1H ,T37,2(I3,' -'),I3,F12.1,F11.1,F15.1,F11.1,F11.1,F12.1)02424400
              C                                                                 02424500
ISN 0254      390   GO TO (400,450,500), HUMOPT                                 02424600
              C---- HUMIDITY RATIO                                              02424700
ISN 0255      400   DUMY1=MXHR(ISSL)/100.0                                      02424800
ISN 0256            DUMY2=MNHR(ISSL)/100.0                                      02424900
ISN 0257            AVG=SHRSS(ISSL)/MXMNPT                                      02425000
ISN 0258            J=1                                                         02425100
ISN 0259            WRITE (OUT,410) ISCTX,ISEGX,J,HRMX(ISSL),DUMY1,HRMN(ISSL),DUMY2,AV02425200
                  1G                                                            02425300
ISN 0260      410   FORMAT (1H0,' HUMIDITY RATIO',T25,'( LB/LB )',T37,2(I3,' -'),I3,F102425400
                  12.4,F11.1,F15.4,F11.1,F17.4)                                 02425500
ISN 0261            IF (J3-2) 550,420,420                                       02425600
ISN 0262      420   DO 430 J=2,J3                                               02425700
ISN 0263            DUMY1=MXHR(J2+J)/100.0                                      02425800
ISN 0264            DUMY2=MNHR(J2+J)/100.0                                      02425900
ISN 0265            AVG=SHRSS(J2+J)/MXMNPT                                      02426000
ISN 0266      430   WRITE (OUT,440) ISCTX,ISEGX,J,HRMX(J2+J),DUMY1,HRMN(J2+J),DUMY2,AV02426100
                  1G                                                            02426200
ISN 0267      440   FORMAT (1H ,T37,2(I3,' -'),I3,F12.4,F11.1,F15.4,F11.1,F17.4)  02426300
ISN 0268            GO TO 550                                                   02426400
              C---- WET-BULB TEMPERATURE                                        02426500
ISN 0269      450   DUMY1=MXTWB(ISSL)/100.0                                     02426600
ISN 0270            DUMY2=MNTWB(ISSL)/100.0                                     02426700
ISN 0271            AVG=STWBSS(ISSL)/MXMNPT                                     02426800
ISN 0272            J=1                                                         02426900
ISN 0273            WRITE (OUT,460) ISCTX,ISEGX,J,TWBMX(ISSL),DUMY1,TWBMN(ISSL),DUMY2,02427000
                  1AVG                                                          02427100
ISN 0274      460   FORMAT (1H0,' WET-BULB TEMPERATURE',T25,'( DEG F )',T37,2(I3,' -')02427200
                  1,I3,F12.1,F11.1,F15.1,F11.1,F17.1)                           02427300
ISN 0275            IF (J3-2) 550,470,470                                       02427400
ISN 0276      470   DO 480 J=2,J3                                               02427500
ISN 0277            DUMY1=MXTWB(J2+J)/100.0                                     02427600
ISN 0278            DUMY2=MNTWB(J2+J)/100.0                                     02427700
ISN 0279            AVG=STWBSS(J2+J)/MXMNPT                                     02427800
ISN 0280      480   WRITE (OUT,490) ISCTX,ISEGX,J,TWBMX(J2+J),DUMY1,TWBMN(J2+J),DUMY2,02427900
                  1AVG                                                          02428000
ISN 0281      490   FORMAT (1H ,T37,2(I3,' -'),I3,F12.1,F11.1,F15.1,F11.1,F17.1)  02428100
ISN 0282            GO TO 550                                                   02428200
              C---- RELATIVE HUMIDITY                                           02428300
ISN 0283      500   DUMY1=MXTWB(ISSL)/100.0                                     02428400
ISN 0284            DUMY2=MNTWB(ISSL)/100.0                                     02428500
ISN 0285            AVG=STWBSS(ISSL)/MXMNPT                                     02428600
ISN 0286            J=1                                                         02428700
ISN 0287            WRITE (OUT,510) ISCTX,ISEGX,J,TWBMX(ISSL),DUMY1,TWBMN(ISSL),DUMY2,02428800
                  1AVG                                                          02428900
ISN 0288      510   FORMAT (1H0,' RELATIVE HUMIDITY',T25,'( PERCENT )',T37,2(I3,' -'),02429000
                  1I3,F12.1,F11.1,F15.1,F11.1,F17.1)                            02429100
ISN 0289            IF (J3-2) 550,520,520                                       02429200
ISN 0290      520   DO 530 J=2,J3                                               02429300
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ISN 0291          DUMY1=MXTWB(J2+J)/100.0                                  02429400
ISN 0292          DUMY2=MNTWB(J2+J)/100.0                                  02429500
ISN 0293          AVG=STWBSS(J2+J)/MXMNPT                                  02429600 <-- C
ISN 0294    530   WRITE (OUT,540) ISCTX,ISEGX,J,TWBMX(J2+J),DUMY1,TWBMN(J2+J),DUMY2,02429700
               1AVG                                                        02429800
ISN 0295      540 FORMAT (1H ,T37,2(I3,' -'),I3,F12.1,F11.1,F15.1,F11.1,F17.1)  02429900 <-- C
            C                                                             02430000
            C---- PRINT PERCENTAGE OF TIME ABOVE OR BELOW DESIGN TEMPERATURE  02430100
            C----          ( LINE SEG. IN TYPE 1 ZONE  ONLY )             02430200
ISN 0296    550   IF (IVS) 555,555,680                                     02430300
ISN 0297    555   IF( HCCPT ) 655,655,560                                  02430400
ISN 0298    560   ICLUST = TABL44(ISSL)                                    02430500
ISN 0299          IF( TYPCL(ICLUST) - 1 ) 661,561,661                     02430600
ISN 0300    561   IF( DESPER - 1 ) 562,562,565                             02430700
            C---- MORNING DESIGN                                           02430800
ISN 0301    562   DO  563  I = 1, 6                                        02430900
ISN 0302    563   DUMMY1(I) = DTDMLS(ILS) + WNTSUM*FLOAT(I-3)              02431000
ISN 0303          GO TO 570                                               02431100
            C---- EVENING DESIGN                                           02431200
ISN 0304    565   DO  567  I = 1, 6                                        02431300
ISN 0305    567   DUMMY1(I) = DTDELS(ILS) + WNTSUM*FLOAT(I-3)              02431400
ISN 0306    570   IF (WNTSUM) 630,580,580                                  02431500
ISN 0307    580   WRITE (OUT,590) DUMMY1                                   02431600
ISN 0308    590   FORMAT (//T43,'P E R C E N T A G E  O F  T I M E  T E M P E R A T 02431700
               1U R E  I S  A B O V E'//T49,6F11.1/T54,6(8('-'),3X)/)     02431800
ISN 0309          DO 610 J=1,J3                                           02431900
ISN 0310          ISS=J2+J                                                02432000
ISN 0311          DO 600 K=1,6                                            02432100
ISN 0312    600   DUMMY1(K)=(100.0*EXDTDB(ISS,K))/MXMNPT                  02432200
ISN 0313    610   WRITE (OUT,620) ISCTX,ISEGX,J,DUMMY1                     02432300
ISN 0314    620   FORMAT (T37,2(I3,' -'),I3,F10.1,5F11.1)                 02432400
ISN 0315          GO TO 655                                               02432500
ISN 0316    630   WRITE (OUT,640) DUMMY1                                  02432600
ISN 0317    640   FORMAT (//T43,'P E R C E N T A G E  O F  T I M E  T E M P E R A T 02432700
               1U R E  I S  B E L O W'//T49,6F11.1/T54,6(8('-'),3X)/)     02432800
ISN 0318          DO 660 J=1,J3                                           02432900
ISN 0319          ISS=J2+J                                                02433000
ISN 0320          DO 650 K=1,6                                            02433100
ISN 0321    650   DUMMY1(K)=(100.0*EXDTDB(ISS,K))/MXMNPT                  02433200
ISN 0322    660   WRITE (OUT,620) ISCTX,ISEGX,J,DUMMY1                     02433300
ISN 0323    655   IF (IVS)  661,661,680                                   02433400
ISN 0324    661   WRITE(OUT,662)                                          02433500
ISN 0325    662   FORMAT(/1H0,T34,'AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT'/ 02433600
               1T34,'------- -------- ---- ----- ------ --- -------')     02433700
ISN 0326          HRFTUV = 0.0                                            02433800
ISN 0327          HRFSSS = 0.0                                            02433900
ISN 0328          HRFECS = 0.0                                            02434000
ISN 0329          HETSNK = 0.0                                            02434100
ISN 0330          UPLATE = 0.0                                            02434200
ISN 0331          DO 668  ISS = ISSL,ISSH                                 02434300
            C                                                             02434400
            C---- HRFTUV = THE HEAT RELEASE FROM TRAINS,UNSTEADY HEAT      02434500
            C----          SOURCES, VISCOUS HEATING, AND EVAPORATION      02434600
            C                                                             02434700
ISN 0332          HRFTUV = HRFTUV + (QSUMSS(ISS)-SHLSS(ISS)*MXMNPT + QSMXSS(ISS))  02434800
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                C                                                       02434900
                C---- HRFSSS = THE HEAT RELEASE FROM STEADY-STATE HEAT SOURCES   02435000
                C                                                       02435100
ISN 0333              HRFSSS = HRFSSS + (SHLSS(ISS) - SACLSS(ISS))      02435200
                C                                                       02435300
                C---- HRFECS = THE HEAT RELEASE FROM THE ENVIRONMENTAL CONTROL SYSTEM   02435400
                C                                                       02435500
ISN 0334              IF (HCCPT) 665,665,663                            02435600
ISN 0335       663    ICLUST = TABL44(ISS)                              02435700
ISN 0336              IF(TYPCL(ICLUST) - 2) 664,665,665                 02435800
ISN 0337       664    HRFECS = HRFECS + SACLSS(ISS)                     02435900
                C                                                       02436000
                C---- HETSNK = THE AMOUNT OF HEAT ABSORBED BY THE WALLS   02436100
                C                                                       02436200
ISN 0338       665    HETSNK = HETSNK+(HTSMSS(ISS)-HSUMSS(ISS)*TSFSS(ISS))*SURLSS(ILS)   02436300
                C                                                       02436400
                C---- UPLATE = THE AMOUNT OF TRAIN HEAT RELEASE EXTRACTED BY   02436500
                C----           THE UNDERPLATFORM EXHAUST SYSTEM        02436600
                C                                                       02436700
ISN 0339              IF (OPTUV) 668,668,667                            02436800
ISN 0340       667    UPLATE = UPLATE + QSMXSS(ISS)                     02436900
ISN 0341       668    CONTINUE                                          02437000
ISN 0342              HRFTUV = (HRFTUV/MXMNPT)*3600.0                   02437100
ISN 0343              HRFSSS = HRFSSS*3600.0                            02437200
ISN 0344              HRFECS = HRFECS*3600.0                            02437300
ISN 0345              HETSNK = -(HETSNK/MXMNPT)*3600.0                  02437400
ISN 0346              UPLATE = -(UPLATE/MXMNPT)*3600.0                  02437500
ISN 0347              WRITE(OUT,669) HRFTUV                             02437600
ISN 0348       669    FORMAT(1H0,T8,'HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES'02437700
                     1,T89,F11.1,T102,'BTU/HR')                         02437800
ISN 0349              WRITE(OUT,670) HRFSSS                             02437900
ISN 0350       670    FORMAT(1H0,T8,'STEADY-STATE HEAT SOURCES',T89,F11.1,T102,'BTU/HR')02438000
ISN 0351              IF (HCOPT) 676,676,672                            02438100
ISN 0352       672    IF (TYPCL(ICLUST) - 2) 674,676,676                02438200
ISN 0353       674    WRITE(OUT,675) HRFECS                             02438300
ISN 0354       675    FORMAT(1H0,T8,'ENVIRONMENTAL CONTROL SYSTEM',T89,F11.1,T102,'BTU/H02438400
                     1R')                                               02438500
ISN 0355       676    WRITE(OUT,677) HETSNK                             02438600
ISN 0356       677    FORMAT(1H0,T8,'HEAT SINK',T89,F11.1,T102,'BTU/HR')02438700
ISN 0357              IF (TYPLS(ILS) - 2) 680,678,680                   02438800
ISN 0358       678    WRITE(OUT,679) UPLATE                             02438900
ISN 0359       679    FORMAT(1H0,T8,'UNDERPLATFORM EXHAUST SYSTEM',T89,F11.1,T102,'BTU/H02439000
                     1R')                                               02439100
ISN 0360       680    CONTINUE                                          02439200
                C                                                       02439300
ISN 0361       685    CONTINUE                                          02439400
                C                                                       02439500
                C                                                       02439600
                C---- PRINT HEAT SINK SUMMARIES IF HEAT SINK HAS BEEN REQUESTED   02439700
                C                                                       02439800
ISN 0362              IF (HSCPT) 950,950,690                            02439900
                C                                                       02440000
ISN 0363       690    WRITE (OUT,700) NSEC,NLS,NVSEC,NTNODE,TNSS,NNODE,MXMNPT   02440100
ISN 0364       700    FORMAT (1H1,T40,' SES DEEP HEAT SINK ANALYSIS  '//' NUMBER OF SECT02440200
                     1IONS',T40,I5/' NUMBER OF LINE SEGMENTS',T40,I5/' NUMBER OF VENTILA02440300
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                 2TION SHAFT SECTIONS',T40,I5/' NUMBER OF THERMAL NODES',T40,I5/' TO02440400
                 3TAL NUMBER OF SUBSEGMENTS',T40,I5/' NUMBER OF AERO NODES',T40,I5/'02440500
                 4 NUMBER OF POINTS TAKEN IN THE SUMMARY',T40,I5//)                 02440600
ISN 0365          WRITE (OUT,710)                                                   02440700
ISN 0366     710  FORMAT (T14,'LOW',T24,'HIGH'/' SECTION',4X,'SEGMENT',3X,'SEGMENT',02440800
                 1T34,'TABL20',T44,'TABL21',T54,'TABL12',T64,'TABL13')              02440900
ISN 0367          DO 720 ISCT=1,NSEC                                                02441000
ISN 0368     720  WRITE (OUT,730) ISCT,TABL9(ISCT),TABL10(ISCT),TABL20(ISCT),TABL21(02441100
                 1ISCT),TABL12(ISCT),TABL13(ISCT)                                   02441200
ISN 0369     730  FORMAT (I6,6I10)                                                  02441300
ISN 0370          WRITE (OUT,740)                                                   02441400
ISN 0371     740  FORMAT (T14,'LOW',T24,'HIGH'/' LINE SEG',3X,'SUBSEG.',3X,'SUBSEG.02441500
                 1')                                                                02441600
ISN 0372          DO 750 ILS=1,NLS                                                  02441700
ISN 0373     750  WRITE (OUT,760) ILS,TABL3(ILS),TABL4(ILS)                         02441800
ISN 0374     760  FORMAT (I6,2I10)                                                  02441900
ISN 0375          IF( NVSEC ) 795,795,765                                           02442000
ISN 0376     765  WRITE (OUT,770)                                                   02442100
ISN 0377     770  FORMAT (T14,'LOW',T24,'HIGH'/' VENT SHAFT',2X,'SUBSEG.',3X,'SUBSEG02442200
                 1.')                                                               02442300
ISN 0378          DO 780 IVS=1,NVSEC                                                02442400
ISN 0379     780  WRITE (OUT,790) IVS,TABL5(IVS),TABL6(IVS)                         02442500
ISN 0380     790  FORMAT (I6,2I10)                                                  02442600
ISN 0381     795  WRITE (OUT,800)                                                   02442700
ISN 0382     800  FORMAT (' LINE SEGMENT',3X,'SUBSEGMENT SURFACE',3X,'PERIMETER',3X,02442800
                 1'AREA')                                                           02442900
ISN 0383          DO 810 ILS=1,NLS                                                  02443000
ISN 0384     810  WRITE (OUT,820) ILS,SURLSS(ILS),PERMLS(ILS),ALS(ILS)              02443100
ISN 0385     820  FORMAT (I7,15X,4F10.2)                                            02443200
ISN 0386          IF( NVSEC ) 855,855,825                                           02443300
ISN 0387     825  WRITE (OUT,830)                                                   02443400
ISN 0388     830  FORMAT (' VENT SHAFT',3X,'SUBSEGMENT SURFACE')                    02443500
ISN 0389          DO 840 IVS=1,NVSEC                                                02443600
ISN 0390     840  WRITE (OUT,850) IVS,SURVSS(IVS)                                   02443700
ISN 0391     850  FORMAT (I7,F15.1)                                                 02443800
ISN 0392     855  WRITE (OUT,860)                                                   02443900
ISN 0393     860  FORMAT (T2,'SUBSEGMENT',5X,'EMTFSS',6X,'EMTBSS',6X,'STDBSS',6X,  02444000
                 1'HSUMSS',6X,'HTSMSS',6X,'QSUMSS',6X,'LSUMSS',6X,'EMHFSS',         02444100
                 2  6X,'EMHBSS' )                                                   02444200
ISN 0394          DO 870 ISS=1,TNSS                                                 02444300
ISN 0395          DUMY1 = EMTFSS(ISS) / MXMNPT                                      02444400
ISN 0396          DUMY2 = EMTBSS(ISS) / MXMNPT                                      02444500
            C     DUMY3 = STDPSS(ISS) / MXMNPT                                      02444600
            C     DUMY3A= STDNSS(ISS) / MXMNPT                                      02444700
ISN 0397          DUMY3 = STDBSS(ISS) / MXMNPT                                      02444800
ISN 0398          DUMY4 = HSUMSS(ISS) / MXMNPT                                      02444900
ISN 0399          DUMY5 = HTSMSS(ISS) / MXMNPT                                      02445000
ISN 0400          DUMY6 = QSUMSS(ISS) / MXMNPT                                      02445100
ISN 0401          DUMY7 = LSUMSS(ISS) / MXMNPT                                      02445200
ISN 0402          DUMY8 = EMHFSS(ISS) / MXMNPT                                      02445300
ISN 0403          DUMY9 = EMHBSS(ISS) / MXMNPT                                      02445400
ISN 0404     870  WRITE(OUT,880) ISS,DUMY1,DUMY2,DUMY3,DUMY4,DUMY5,DUMY6,           02445500
                 1  DUMY7,DUMY8,DUMY9                                               02445600
ISN 0405          DO 875 ISS = 1,TNSS                                               02445700
ISN 0406          DUMY10 = FLOFSS(ISS) / MXMNPT                                     02445800
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ISN 0407          DUMY11 = FLOPSS(ISS) / MXMNPT                                  02445900
ISN 0408      875 WRITE(OUT,877) ISS,DUMY10,DUMY11                                02446000
ISN 0409      877 FORMAT(I7,2F12.3)                                               02446100
ISN 0410    880   FORMAT( I7,F15.0,F12.0,F12.2,2F12.7,2F12.5,2F12.5 )            02446200
ISN 0411          WRITE (OUT,890)                                                 02446300
ISN 0412    890   FORMAT(/T3,'NODTH',T14,'EMTBR1',T26,'EMTBR2',T38,'EMTBR3',T50,'EMT02446400
                 1BR4',T62,'EMTBR5')                                              02446500
ISN 0413          DO 900 I=1,NTNODE                                               02446600
ISN 0414          DUMY1 = EMTBTN(I,1) / MXMNPT                                    02446700
ISN 0415          DUMY2 = EMTBTN(I,2) / MXMNPT                                    02446800
ISN 0416          DUMY3 = EMTBTN(I,3) / MXMNPT                                    02446900
ISN 0417          DUMY4 = EMTBTN(I,4) / MXMNPT                                    02447000
ISN 0418          DUMY5 = EMTBTN(I,5) / MXMNPT                                    02447100
ISN 0419          DUMY11 = FLOBTN(I,1) / MXMNPT                                   02447200
ISN 0420          DUMY12 = FLOBTN(I,2) / MXMNPT                                   02447300
ISN 0421          DUMY13 = FLOBTN(I,3) / MXMNPT                                   02447400
ISN 0422          DUMY14 = FLOBTN(I,4) / MXMNPT                                   02447500
ISN 0423          DUMY15 = FLOBTN(I,5) / MXMNPT                                   02447600
ISN 0424    900   WRITE(OUT,910) I,DUMY1,DUMY2,DUMY3,DUMY4,DUMY5,                 02447700
                 1 DUMY11,DUMY12,DUMY13,DUMY14,DUMY15                             02447800
ISN 0425    910   FORMAT (I7,F14.0,4F12.0,5F12.3)                                 02447900
ISN 0426          WRITE(OUT,911)                                                  02448000
ISN 0427    911   FORMAT(/T3,'NODTH',T14,'EMHBR1',T26,'EMHBR2',T38,'EMHBR3',     02448100
                 1  T50,'EMHBR4',T62,'EMHBR5' ,T74,'TAVGTN',T86,'HAVGTN')         02448200
ISN 0428          DO  912  I = 1, NTNODE                                          02448300
ISN 0429          DUMY1 = EMHBTN(I,1) / MXMNPT                                    02448400
ISN 0430          DUMY2 = EMHBTN(I,2) / MXMNPT                                    02448500
ISN 0431          DUMY3 = EMHBTN(I,3) / MXMNPT                                    02448600
ISN 0432          DUMY4 = EMHBTN(I,4) / MXMNPT                                    02448700
ISN 0433          DUMY5 = EMHBTN(I,5) / MXMNPT                                    02448800
ISN 0434          DUMY6 = TAVGTN(I)/MXMNPT                                        02448900
ISN 0435          DUMY7 = HAVGTN(I)/MXMNPT                                        02449000
ISN 0436    912   WRITE(OUT,913) I,DUMY1,DUMY2,DUMY3,DUMY4,DUMY5,DUMY6,DUMY7     02449100
ISN 0437    913   FORMAT(I7,F14.6,4F12.6 ,F12.3,F12.6)                            02449200
ISN 0438          WRITE(OUT,920)                                                  02449300
ISN 0439    920   FORMAT (' AERO NODE',T15,'TYPE',T24,'TABL22(NODE)')             02449400
ISN 0440          DO 930 I=1,NNODE                                                02449500
ISN 0441    930   WRITE (OUT,940) I,TYPTND(I),TABL22(I)                           02449600
ISN 0442    940   FORMAT (I6,I11,I10)                                             02449700
            C                                                                     02449800
            C---- SUMMARY TOTAL INITIALIZATION   ************************************02449900
            C                                                                     02450000
ISN 0443      950 IF( ICPT - 2 ) 990,2000,990                                     02450100
ISN 0444      990 IF( NOSYS ) 1500,1500,1000                                      02450200
            C                                                                     02450300
            C---- LOOP OVER SECTIONS                                              02450400
            C                                                                     02450500
ISN 0445     1000 DO  1080  ISCT = 1, NSEC                                        02450600
ISN 0446          QSMN(ISCT) = QSAVES(ISCT)                                       02450700
ISN 0447          QSMX(ISCT) = QSAVES(ISCT)                                       02450800
ISN 0448          MNQS(ISCT) = NTIME                                              02450900
ISN 0449          MXQS(ISCT) = NTIME                                              02451000
ISN 0450          IF( QSAVES(ISCT) ) 1020,1010,1010                               02451100
            C---- Q IS POSITIVE                                                   02451200
ISN 0451     1010 SUMQPS(ISCT) = QSAVES(ISCT)                                     02451300
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ISN 0452          SUMQNS(ISCT) = 0.0                                          02451400
ISN 0453          NTQPS(ISCT) = 1                                             02451500
ISN 0454          GO TO 1025                                                  02451600
            C---- Q IS NEGATIVE                                               02451700
ISN 0455     1020 SUMQNS(ISCT) = QSAVES(ISCT)                                 02451800
ISN 0456          SUMQPS(ISCT) = 0.0                                          02451900
ISN 0457          NTQPS(ISCT) = 0                                             02452000
            C---- CHECK IF VENT SHAFT                                         02452100
ISN 0458     1025 IF( TABL9(ISCT) ) 1030,1080,1080                            02452200
            C---- VENT SHAFT  -  CHECK MAX OUTFLOW VELOCITY                   02452300
ISN 0459     1030 IVS = - TABL9(ISCT)                                         02452400
ISN 0460          EXVOVS(IVS) = 0                                             02452500
ISN 0461          IF( VCMXVS(IVS) * AGVS(IVS) - ABS( QSAVES(ISCT))) 1040,1071,1071  02452600
ISN 0462     1040 NODEB = TABL12(ISCT)                                        02452700
ISN 0463          IF( TABL16(NODEB) - 1 ) 1050,1050,1060                      02452800
            C---- BACKWARD END OF V.S. IS CONN. TO ATMOS. - OUTFLOW IS NEGATIVE  02452900
ISN 0464     1050 IF( QSAVES(ISCT) ) 1070,1071,1071                           02453000
            C---- FORWARD END OF V.S. IS CONN. TO ATMOS. OR SHAFT IS BETWEEN   02453100
            C---- TWO BRANCHED JUNCTIONS  -  OUTFLOW IS POSITIVE               02453200
ISN 0465     1060 IF( QSAVES(ISCT) ) 1071,1071,1070                           02453300
ISN 0466     1070 EXVOVS(IVS) = 1                                             02453400
            C---- MAXIMUM AND MINIMUM PRESSURE IN VENT SHAFT                  02453500
ISN 0467     1071 FPMXVS(IVS) = 0.0                                           02453600
ISN 0468          MXFPVS(IVS) = NTIME                                         02453700
ISN 0469          FPMNVS(IVS) = 0.0                                           02453800
ISN 0470          MNFPVS(IVS) = NTIME                                         02453900
ISN 0471     1080 CONTINUE                                                    02454000
            C                                                                 02454100
            C                                                                 02454200
ISN 0472          IF( JRATTH ) 1500,1500,1090                                 02454300
            C                                                                 02454400
            C---- LINE AND VENT SHAFT SUBSEGMENT INITIALIZATION  *************  02454500
            C                                                                 02454600
ISN 0473     1090 DO  1130  ISS = 1, INSS                                     02454700
ISN 0474          TDBMX(ISS) = TDBSS(ISS)                                     02454800
ISN 0475          TDBMN(ISS) = TDBSS(ISS)                                     02454900
ISN 0476          MXTDB(ISS) = NTIME                                          02455000
ISN 0477          MNTDB(ISS) = NTIME                                          02455100
ISN 0478          HRMX(ISS) = HUMSS(ISS)                                      02455200
ISN 0479          HRMN(ISS) = HUMSS(ISS)                                      02455300
ISN 0480          MXHR(ISS) = NTIME                                           02455400
ISN 0481          MNHR(ISS) = NTIME                                           02455500
ISN 0482          STDBSS(ISS) = TDBSS(ISS)                                    02455600
ISN 0483          SHRSS(ISS) = HUMSS(ISS)                                     02455700
ISN 0484          HSUMSS(ISS) = HTRNSS(ISS)                                   02455800
ISN 0485          HTSMSS(ISS) = HTRNSS(ISS)*TDBSS(ISS)                        02455900
ISN 0486          QSUMSS(ISS) = SHLTSS(ISS)                                   02456000
ISN 0487          QSMXSS(ISS) = SHUXSS(ISS)                                   02456100
ISN 0488          LSUMSS(ISS) = LHLTSS(ISS)                                   02456200
ISN 0489          EMTFSS(ISS) = 0.0                                           02456300
ISN 0490          EMTBSS(ISS) = 0.0                                           02456400
ISN 0491          EMHFSS(ISS) = 0.0                                           02456500
ISN 0492          EMHBSS(ISS) = 0.0                                           02456600
ISN 0493          FLOFSS(ISS) = 0.0                                           02456700
ISN 0494          FLOBSS(ISS) = 0.0                                           02456800
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ISN 0495            IF( FFSS(ISS) ) 1110,1110,1100                          02456900
ISN 0496      1100 EMTFSS(ISS) = TDBSS(ISS)*FFSS(ISS)                       02457000
ISN 0497            EMHFSS(ISS) = HUMSS(ISS)*FFSS(ISS)                      02457100
ISN 0498            FLOFSS(ISS) = FFSS(ISS)                                 02457200
ISN 0499      1110 IF( FBSS(ISS) ) 1120,1130,1130                           02457300
ISN 0500      1120 EMTBSS(ISS) = - TDBSS(ISS)*FBSS(ISS)                     02457400
ISN 0501            EMHBSS(ISS) = - HUMSS(ISS)*FBSS(ISS)                    02457500
ISN 0502            FLOBSS(ISS) = - FBSS(ISS)                               02457600
ISN 0503      1130 CONTINUE                                                 02457700
ISN 0504            DO  1139  ISCT = 1, NSEC                                02457800
ISN 0505            ISEGL = TABL9(ISCT)                                     02457900
ISN 0506            ISEGH = TABL10(ISCT)                                    02458000
ISN 0507            IF( ISEGL ) 1132,1133,1133                              02458100
              C---- VENT SHAFT SECTION                                      02458200
ISN 0508      1132 ISEGL = - ISEGL                                          02458300
ISN 0509            ISSL = TABL5(ISEGL)                                     02458400
ISN 0510            ISSH = TABL6(ISEGL)                                     02458500
ISN 0511            GO TO 1134                                              02458600
              C---- LINE SECTION                                            02458700
ISN 0512      1133 ISSL = TABL3(ISEGL)                                      02458800
ISN 0513            ISSH = TABL4(ISEGH)                                     02458900
ISN 0514      1134 IF( QSAVES(ISCT) ) 1137,1135,1135                        02459000
ISN 0515      1135 DO  1136  ISS = ISSL,ISSH                                02459100
ISN 0516            STDPSS(ISS) = TDBSS(ISS)                                02459200
ISN 0517      1136 STDNSS(ISS) = 0                                          02459300
ISN 0518            GO TO 1139                                              02459400
ISN 0519      1137 DO  1138  ISS = ISSL,ISSH                                02459500
ISN 0520            STDNSS(ISS) = TDBSS(ISS)                                02459600
ISN 0521      1138 STDPSS(ISS) = 0                                          02459700
ISN 0522      1139 CONTINUE                                                 02459800
              C                                                             02459900
ISN 0523            GO TO ( 1180, 1140, 1160 ), HUMOPT                      02460000
              C---- WET-BULB TEMPERATURE                                    02460100
ISN 0524      1140 DO  1150  ISS = 1, TNSS                                  02460200
ISN 0525            CALL  WETBLB( TDBSS(ISS), HUMSS(ISS), TWBSS(ISS) )      02460300
ISN 0526            TWBMX(ISS) = TWBSS(ISS)                                 02460400
ISN 0527            TWBMN(ISS) = TWBSS(ISS)                                 02460500
ISN 0528            MXTWB(ISS) = NTIME                                      02460600
ISN 0529            MNTWB(ISS) = NTIME                                      02460700
ISN 0530      1150 STWBSS(ISS) = TWBSS(ISS)                                 02460800
ISN 0531            GO TO 1180                                              02460900
              C---- RELATIVE HUMIDITY                                       02461000
ISN 0532      1160 DO  1170  ISS = 1, TNSS                                  02461100
ISN 0533            CALL  RELHUM( TDBSS(ISS), HUMSS(ISS), TWBSS(ISS) )      02461200
ISN 0534            TWBMX(ISS) = TWBSS(ISS)                                 02461300
ISN 0535            TWBMN(ISS) = TWBSS(ISS)                                 02461400
ISN 0536            MXTWB(ISS) = NTIME                                      02461500
ISN 0537            MNTWB(ISS) = NTIME                                      02461600
ISN 0538      1170 STWBSS(ISS) = TWBSS(ISS)                                 02461700
              C                                                             02461800
              C---- DESIGN TEMPERATURE TABULATION                            02461900
ISN 0539      1180 IF( HCOPT ) 1252,1252,1181                               02462000
ISN 0540      1181 DO  1250  ILS = 1, NLS                                   02462100
ISN 0541            ISSL = TABL3(ILS)                                       02462200
ISN 0542            ISSH = TABL4(ILS)                                       02462300
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ISN 0543          ICLUST = TABL44(ISSL)                                    02462400
ISN 0544          IF( TYPCL(ICLUST) - 1 ) 1250,1183,1250                   02462500
ISN 0545     1183 IF( DESPER - 1 ) 1185,1185,1241                          02462600
            C                                                              02462700
            C---- MORNING DESIGN PERIOD                                    02462800
ISN 0546     1185 IF( WNTSUM ) 1220,1190,1190                              02462900
            C---- SUMMER DESIGN                                            02463000
ISN 0547     1190 DO  1210  ILSS = ISSL, ISSH                              02463100
ISN 0548          DO  1210  I = 1, 6                                       02463200
ISN 0549          EXDTDB(ILSS,I) = 0                                       02463300
ISN 0550          IF( TDBSS(ILSS) - DTDMLS(ILS) - WNTSUM*FLOAT(I-3) ) 1210,1210,1200 02463400
ISN 0551     1200 EXDTDB(ILSS,I) = 1                                       02463500
ISN 0552     1210 CONTINUE                                                 02463600
ISN 0553          GO TO 1250                                               02463700
            C---- WINTER DESIGN                                            02463800
ISN 0554     1220 DO  1240  ILSS = ISSL, ISSH                              02463900
ISN 0555          DO  1240  I = 1, 6                                       02464000
ISN 0556          EXDTDB(ILSS,I) = 0                                       02464100
ISN 0557          IF( TDBSS(ILSS) - DTDMLS(ILS) - WNTSUM*FLOAT(I-3) ) 1230,1240,1240 02464200
ISN 0558     1230 EXDTDB(ILSS,I) = 1                                       02464300
ISN 0559     1240 CONTINUE                                                 02464400
ISN 0560          GO TO 1250                                               02464500
            C                                                              02464600
            C---- EVENING DESIGN PERIOD                                    02464700
ISN 0561     1241 IF( WNTSUM ) 1245,1242,1242                              02464800
            C---- SUMMER DESIGN                                            02464900
ISN 0562     1242 DO  1244  ILSS = ISSL, ISSH                              02465000
ISN 0563          DO  1244  I = 1, 6                                       02465100
ISN 0564          EXDTDB(ILSS,I) = 0                                       02465200
ISN 0565          IF( TDBSS(ILSS) - DTDELS(ILS) - WNTSUM*FLOAT(I-3) )1244,1244,1243 02465300
ISN 0566     1243 EXDTDB(ILSS,I) = 1                                       02465400
ISN 0567     1244 CONTINUE                                                 02465500
ISN 0568          GO TO 1250                                               02465600
            C---- WINTER DESIGN                                            02465700
ISN 0569     1245 DO  1247  ILSS = ISSL, ISSH                              02465800
ISN 0570          DO  1247  I= 1, 6                                        02465900
ISN 0571          EXDTDB(ILSS,I) = 0                                       02466000
ISN 0572          IF( TDBSS(ILSS) - DTDELS(ILS) - WNTSUM*FLOAT(I-3) )1246,1247,1247 02466100
ISN 0573     1246 EXDTDB(ILSS,I) = 1                                       02466200
ISN 0574     1247 CONTINUE                                                 02466300
ISN 0575     1250 CONTINUE                                                 02466400
            C                                                              02466500
            C---- NODE SUMMARY INITIALIZATION   ************************************02466600
            C                                                              02466700
ISN 0576     1252 DO  1410  NODE = 1, NNODE                                02466800
ISN 0577          ITYPT = TYPTND(NODE)                                     02466900
ISN 0578          IT22 = TABL22(NODE)                                      02467000
ISN 0579          GO TO ( 1256,1255,1255,1263,1263),ITYPT                  02467100
ISN 0580     1255 K = 3                                                    02467200
ISN 0581          GO TO 1257                                               02467300
ISN 0582     1256 K = 1                                                    02467400
ISN 0583     1257 DO  1260  I = 1, K                                       02467500
            C---- INITIALIZE NODE FLOW SUMMATION                           02467600
ISN 0584          SUMQ(I) = 0.0                                            02467700
ISN 0585          NODTH = IT22 + I                                         02467800
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                C---- INITIALIZE ENERGY FLOWS AT NODE                                  02467900
ISN 0586              DO  1260  J = 1, LMSCND                                         02468000
ISN 0587              EMHBTN(NODTH,J) = 0.0                                           02468100
ISN 0588              FLOBTN(NODTH,J) = 0.0                                           02468200
ISN 0589       1260   EMTBTN(NODTH,J) = 0.0                                           02468300
ISN 0590              GO TO 1265                                                      02468400
                C***** THERMODYNAMIC TYPE 4 AND 5 NODES - INTERNAL TYPES              02468500
ISN 0591       1263   SUMQ(1) = 0.0                                                   02468600
ISN 0592              NODTH = IT22 + 1                                                02468700
ISN 0593              EMHBTN(NODTH,1) = 0.0                                           02468800
ISN 0594              FLOBTN(NODTH,1) = 0.0                                           02468900
ISN 0595              EMTBTN(NODTH,1) = 0.0                                           02469000
ISN 0596       1265   KSCT = TABL16(NODE)                                             02469100
ISN 0597              DO  1340  I = 1, KSCT                                           02469200
ISN 0598              NUMY1=TABL17(NODE,I)                                            02469300
ISN 0599              ISCT=IABS(NUMY1)                                                02469400
ISN 0600              ISIGN=ISCT/NUMY1                                                02469500
ISN 0601              ISS = TABL18(NODE,I)                                            02469600
ISN 0602              IF( ISIGN ) 1310,1280,1280                                      02469700
                C---- FORWARD END OF SECTION IS CONNECTED TO NODE                     02469800
ISN 0603       1280   NODTH = TABL21(ISCT) / 64                                       02469900
ISN 0604              IF( FFSS(ISS) ) 1290,1300,1300                                  02470000
ISN 0605       1290   IBRCH = TABL21(ISCT) - NODTH*64                                 02470100
ISN 0606              EMHBTN(NODTH,IBRCH) = EMHBTN(NODTH,IBRCH) - FFSS(ISS)*HUMTN(NODTH)02470200
ISN 0607              EMTBTN(NODTH,IBRCH) = EMTBTN(NODTH,IBRCH) - FFSS(ISS)*TDBTN(NODTH)02470300
ISN 0608              FLOBTN(NODTH,IBRCH) = FLOBTN(NODTH,IBRCH) - FFSS(ISS)           02470400
ISN 0609       1300   J = NODTH - TABL22(NODE)                                        02470500
ISN 0610              SUMQ(J) = SUMQ(J) - FFSS(ISS)                                   02470600
ISN 0611              GO TO 1340                                                      02470700
                C---- BACKWARD END OF SECTION IS CONNECTED TO NODE                    02470800
ISN 0612       1310   NODTH = TABL20(ISCT) / 64                                       02470900
ISN 0613              IF( FBSS(ISS) ) 1330,1330,1320                                  02471000
ISN 0614       1320   IBRCH = TABL20(ISCT) - NODTH*64                                 02471100
ISN 0615              EMHBTN(NODTH,IBRCH) = EMHBTN(NODTH,IBRCH) + FBSS(ISS)*HUMTN(NODTH)02471200
ISN 0616              EMTBTN(NODTH,IBRCH) = EMTBTN(NODTH,IBRCH) + FBSS(ISS)*TDBTN(NODTH)02471300
ISN 0617              FLOBTN(NODTH,IBRCH) = FLOBTN(NODTH,IBRCH) + FBSS(ISS)           02471400
ISN 0618       1330   J = NODTH - TABL22(NODE)                                        02471500
ISN 0619              SUMQ(J) = SUMQ(J) + FBSS(ISS)                                   02471600
ISN 0620       1340   CONTINUE                                                        02471700
ISN 0621              ITYPT = TYPTNO(NODE)                                            02471800
ISN 0622              GO TO ( 1410, 1350, 1350, 1410, 1410 ), ITYPT                   02471900
                C                                                                     02472000
                C***** THERMODYNAMIC TYPE 2 AND 3 NODES (NON-MIXING)                  02472100
                C --  SUMQ IS POSITIVE FOR AIR ENTERING END NODE FROM CENTER NODE     02472200
                C---- COMPUTE INTRA-NODE FLOWS                                         02472300
ISN 0623       1350   IT22 = TABL22(NODE)                                             02472400
ISN 0624              IF( SUMQ(1) ) 1360,1360,1370                                    02472500
                C---- AIR IS FLOWING FROM 1(A) TO 2(B)                                02472600
ISN 0625       1360   EMTBTN(IT22+1,5) = EMTBTN(IT22+1,5) - SUMQ(1)*TDBTN(IT22+1)     02472700
ISN 0626              EMHBTN(IT22+1,5) = EMHBTN(IT22+1,5) - SUMQ(1)*HUMTN(IT22+1)     02472800
ISN 0627              FLOBTN(IT22+1,5) = FLOBTN(IT22+1,5) - SUMQ(1)                   02472900
ISN 0628              GO TO 1380                                                      02473000
                C---- AIR IS FLOWING FROM 2(B) TO 1(A)                                02473100
ISN 0629       1370   EMTBTN(IT22+2,4) = EMTBTN(IT22+2,4) + SUMQ(1)*TDBTN(IT22+2)     02473200
ISN 0630              EMHBTN(IT22+2,4) = EMHBTN(IT22+2,4) + SUMQ(1)*HUMTN(IT22+2)     02473300
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ISN 0631          FLOBTN(IT22+2,4) = FLOBTN(IT22+2,4) + SUMQ(1)                 02473400
            C                                                                   02473500
ISN 0632     1380 IF( SUMQ(3) ) 1390,1400,1400                                  02473600
            C---- AIR IS FLOWING FROM 3(C) TO 2(B)                              02473700
ISN 0633     1390 EMTBTN(IT22+3,5) = EMTBTN(IT22+3,5) - SUMQ(3)*TDBTN(IT22+3)   02473800
ISN 0634          EMHBTN(IT22+3,5) = EMHBTN(IT22+3,5) - SUMQ(3)*HUMTN(IT22+3)   02473900
ISN 0635          FLOBTN(IT22+3,5) = FLOBTN(IT22+3,5) - SUMQ(3)                 02474000
ISN 0636          GO TO 1410                                                    02474100
            C---- AIR IS FLOWING FROM 2(B) TO 3(C)                              02474200
ISN 0637     1400 EMTBTN(IT22+2,5) = EMTBTN(IT22+2,5) + SUMQ(3)*TDBTN(IT22+2)   02474300
ISN 0638          EMHBTN(IT22+2,5) = EMHBTN(IT22+2,5) + SUMQ(3)*HUMTN(IT22+2)   02474400
ISN 0639          FLOBTN(IT22+2,5) = FLOBTN(IT22+2,5) + SUMQ(3)                 02474500
            C                                                                   02474600
ISN 0640     1410 CONTINUE                                                      02474700
ISN 0641          DO 1415 NODTH = 1,NTNODE                                      02474800
ISN 0642          TAVGTN(NODTH) = TDBTN(NODTH)                                  02474900
ISN 0643          HAVGTN(NODTH) = HUMTN(NODTH)                                  02475000
ISN 0644     1415 CONTINUE                                                      02475100
            C                                                                   02475200
            C     MXMNPT IS A COUNT OF THE NUMBER OF POINTS WHICH               02475300
            C     HAVE BEEN ADDED INTO TOTALS                                   02475400
            C                                                                   02475500
ISN 0645     1500 MXMNPT = 1                                                    02475600
            C                                                                   02475700
            C---- SUMTST CONTAINS THE TIME OF THE LAST SUMMARY INITIALIZATION   02475800
ISN 0646          SUMTST = FLOAT(NTIME)/ 100.0                                  02475900
ISN 0647     2000 RETURN                                                        02476000
            C                                                                   02476100
ISN 0648          END                                                           02476200
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SUBWAY ENVIRONMENT SIMULATION (SES) COMPUTER PROGRAM

REVISION NO. 3 TO VERSION 2

Problem

Under certain circumstances a floating point division by zero may occur in subroutine TRAIN. This may also result in the "runaway" operation of the affected train.

Symptoms

Floating point division by zero will result in a Simulation Error Type 2. The accompanying message gives the simulation time at which the error occurred.

Correction

See attached corrected listing of subroutine TRAIN. Corrected lines are indicated by the letter "C,"; new lines are indicated by the letter "I."

Effect on Previous Results

This problem is present only in runs containing a Simulation Error Type 2. Runs containing this message must be examined on an individual basis to determine the validity of the results.

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          COMPILER OPTIONS - NAME=  MAIN,OPT=02,LINECNT=57,SIZE=0000K,
                             SOURCE,EBCDIC,NOLIST,NODECK,LOAD,MAP,NOEDIT,ID,NOXREF
 ISN 0002            SUBROUTINE TRAIN                                          02579800
               C     INCLUDE  DSHARE                                           02579900
               C                                                               02580000
               C ************************* INTEGER VARIABLES ************************* C02580100
               C                                                               02580200
               C  GENERAL VARIABLES                                            02580300
 ISN 0003            INTEGER   AETIME, BLANK, BLPREQ, DATE(8), DEATH, DESPER, ESCFT   02580400
 ISN 0004            INTEGER   HCOPT, HSOPT, HUMOPT, OUT, PRTIME, SLASH, SUPOPT      02580500
 ISN 0005            INTEGER   SYSTEM(18), THOPT, THTIME, TNLSS, TNSS, TPOPT, TRTIME 02580600
               C  SECTION VARIABLES  (LMSECT)                                  02580700
 ISN 0006            INTEGER   NTOPS(140)                                      02580800
 ISN 0007            INTEGER   TABL9(140), TABL10(140), TABL11(140), TABL12(140)  02580900
 ISN 0008            INTEGER   TABL13(140), TABL20(140), TABL21(140)           02581000
               C    SECTION (LMSECT), SECTION+ONE  (LMSECT+1) ,  SECTION+TWO (LMSECT+2)02581100
 ISN 0009            INTEGER   ND(140), NDS(141), NDSS(142)                    02581200
               C    SECTION * ESTIMATED AVERAGE OF 3 LOOPS THROUGH SECTION ( LMLPK )  02581300
 ISN 0010            INTEGER   LKAN(420)                                       02581400
               C    SECTION EXTERNAL IDENTIFICATION NUMBERS (LMSCTX)           02581500
 ISN 0011            INTEGER   TABL14(400)                                     02581600
               C  NODE VARIABLES  (LMNODE)                                     02581700
 ISN 0012            INTEGER   TABL1(132), TABL15(130), TABL16(130), TABL22(130)  02581800
 ISN 0013            INTEGER   TABL23(132), TABL45(130), TYPTND(130)           02581900
               C  AERODYNAMIC NODE VARIABLES (LMTBL2)                          02582000
 ISN 0014            INTEGER   TABL2(1500)                                     02582100
               C    NODES BY NUMBER OF SECTIONS CONNECTED TO NODE (LMNODE X LMSCND)  02582200
 ISN 0015            INTEGER   TABL17(130,5), TABL18(130,5)                    02582300
               C    NODE EXTERNAL IDENTIFICATION NUMBERS (LMSCTX)              02582400
 ISN 0016            INTEGER   TABL19(400)                                     02582500
               C  LOOP VARIABLES  (LMNLOP)                                     02582600
               C  LINE SEGMENT VARIABLES  (LMLSEG)                             02582700
 ISN 0017            INTEGER   NTRNLS(90), NUMLS(90), TABL3(90), TABL4(90), TABL8(90)  02582800
 ISN 0018            INTEGER   TYPLS(90)                                       02582900
               C    LINE SEGMENT BY NUMBER OF TRAINS IN SEGMENT  (LMLSEG X LMTRSG)  02583000
 ISN 0019            INTEGER   TRNNLS(90,8)                                    02583100
               C  VENTILATION SHAFT SEGMENT VARIABLES    ( LMVSEG )            02583200
 ISN 0020            INTEGER   FTOFVS(60), FTONVS(60), NUMVS(60)               02583300
 ISN 0021            INTEGER   TABL6(60), TYPVS(60), EXVOVS(60), FTYPVS(60), TABL5(60) 02583400
               C  SUBSEGMENT VARIABLES  (LMSS)                                 02583500
 ISN 0022            INTEGER   TABL7(300), TABL44(300)                         02583600
               C  LINE SUBSEGMENT VARIABLES   ( LMLSS X TABLE SIZE )           02583700
 ISN 0023            INTEGER   EXOTDB(250,6)                                   02583800
               C    LINE SUBSEGMENT BY TRAIN ROUTE ( LMLSS X LMTRRT )          02583900
 ISN 0024            INTEGER   ITNLSS(250,6)                                   02584000
               C  HEATING OR COOLING ZONE CLUSTER VARIABLES  (LMCLST)          02584100
 ISN 0025            INTEGER   TYPCL(30)                                       02584200
               C  SUBWAY VEHICLE TYPE VARIABLES  (LMTRTP)                      02584300
 ISN 0026            INTEGER   NCARV(3), NPCARV(3)                             02584400
               C  UNDERPLATFORM EXHAUST VARIABLES                              02584500
 ISN 0027            INTEGER   OPTUX                                           02584600
               C  ROUTE VARIABLES  (LMTRRT)                                    02584700
 ISN 0028            INTEGER   COPTRT(6), NTSRT(6)                             02584800
               C    DISPATCHER VARIABLES (LMTRRT) AND (LMTRGP X LMTRRT)        02584900
 ISN 0029            INTEGER   GRTYPV(15,6), JGROUP(6), NGRV(6), NMTRGR(6)     02585000
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ISN 0030          INTEGER   NTRGP(15,6)                                    02585100
ISN 0031          INTEGER   GRHDWY(15,6)                                   02585200
            C    TRACK SECTION VARIABLES  (LMTSRT X LMTRRT)                02585300
ISN 0032          INTEGER   DWLTS(260,6)                                   02585400
ISN 0033          INTEGER   NPETTS(260,6), NSEGTS(260,6)                   02585500
            C    EXPLICIT TRAIN PERFORMANCE VARIABLES  (LMEXPD X LMTRRT)   02585600
ISN 0034          INTEGER   NEXPDP(6)                                      02585700
ISN 0035          INTEGER   TIMEV(201,6)                                   02585800
            C  OPERATIONAL TRAIN VARIABLES  (LMTRAN)                       02585900
ISN 0036          INTEGER   DPV(30), INDEX(30), IROTEV(30), ITYPV(30), MODEV(30)  02586000
ISN 0037          INTEGER   NTSV(30), NTSV2(30), TNUMV(30)                 02586100
ISN 0038          INTEGER   TLPSV(30), TSTRTV(30)                          02586200
            C  FAN TYPE VARIABLES  (LMFNTP)                                02586300
            C  UNSTEADY HEAT LOAD VARIABLES  ( LMUL )                      02586400
ISN 0039          INTEGER   LSSUL(10)                                      02586500
            C  PRINT GROUP VARIABLES  ( LMPRGP )                           02586600
ISN 0040          INTEGER   GINTPR(15), GRABBP(15), GRSUM(15), NPRGR(15)   02586700
            C                                                              02586800
            C ************************** REAL VARIABLES ************************** C02586900
            C                                                              02587000
            C  GENERAL VARIABLES                                           02587100
ISN 0041          REAL      NUAIR, MPHFPS                                  02587200
            C  SECTION VARIABLES                                           02587300
            C  NODE VARIABLES                                              02587400
            C  LOOP VARIABLES                                              02587500
            C  LINE SEGMENT VARIABLES                                      02587600
ISN 0042          REAL      LLS(90), LLSS(90)                              02587700
            C  VENTILATION SHAFT SEGMENT VARIABLES                         02587800
ISN 0043          REAL      LVS(60), LVSS(60)                              02587900
            C  SUBSEGMENT VARIABLES                                        02588000
ISN 0044          REAL      LHLTSS(300), LSUMSS(300)                       02588100
            C  LINE SUBSEGMENT VARIABLES                                   02588200
ISN 0045          REAL      LACLSS(250), LHLSS(250)                        02588300
            C  ZONE VARIABLES                                              02588400
            C  SUBWAY VEHICLE TYPE VARIABLES                               02588500
ISN 0046          REAL      LAMDAV(3), LHREV(3), LV(3), MCPGAV(3), MCPGDV(3)  02588600
ISN 0047          REAL      MOTORV(3)                                      02588700
            C  ROUTE VARIABLES                                             02588800
            C    DISPATCHER VARIABLES                                      02588900
            C    TRACK SECTION VARIABLES                                   02589000
            C    EXPLICIT TRAIN PERFORMANCE VARIABLES                      02589100
            C  OPERATIONAL TRAIN VARIABLES                                 02589200
            C  FAN TYPE VARIABLES                                          02589300
            C  PRINT GROUP VARIABLES                                       02589400
            C                                                              02589500
            C ****************************** COMMON ****************************** C02589600
            C                                                              02589700
            C GENERAL VARIABLES                                            02589800
ISN 0048          COMMON    AETIME, ANNAMP, BLANK, BLPREC, DATE, DEATH     02589900
ISN 0049          COMMON    DELAE, DELP, DELT, DELTH, DELTR, DEL2TH, DESPER, FSCFT  02590000
ISN 0050          COMMON    HCOPT, HMAMBE, HMAMBM, HOUR, HSOPT, HUMAMB, HUMOPT  02590100
ISN 0051          COMMON    IEQUAT, IN, INODE, IPRGRP, ISITU, JRATAE, JRATTH, JRATTR  02590200
ISN 0052          COMMON    KAERO, KASTEP, KBND1, KBND2, KBND3, KPRNTH, KTSTEP, LIFE  02590300
ISN 0053          COMMON    LINES, MAXTIM, MONTH, MXMNPT, NBR, NBRJCT, NCLUST, NDELT  02590400
ISN 0054          COMMON    NDTYPA, NEW, NFNTYP, NLOOP, NLS, NLSCP1, NLSEC, NNODE  02590500
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ISN 0055          COMMON   NOSUMY, NOSYS, NOTRAN, NPGRP, NPORTL, NSEC, NSIMFR        02590600
ISN 0056          COMMON   NTIME, NTNODE, NTRAN, NTRRTE, NTRTYP, NUMUL, NVSEC        02590700
ISN 0057          COMMON   NZONE, OUT, PAMB, PRTIME, SLASH                           02590800
ISN 0058          COMMON   SUMTST, SUPOPT, SYSTEM, TAMBA, TAMBM, TDBAMB              02590900
ISN 0059          COMMON   THOPT, THTIME, TNLSS, TNSS, TPOPT, TRTIME, TWBAMB, TWAMBE02591000
ISN 0060          COMMON   TWAMBM, WNTSUM                                            02591100
            C  ARRAY SIZE LIMITS                                                     02591200
ISN 0061          COMMON   LMBLP,LMCLST,LMCOND,LMEGRM, LMEXPD, LMFNTP, LMLPK, LMLPLK02591300
ISN 0062          COMMON   LMLSEG, LMLSS, LMNLOP, LMNODE, LMNODX, LMPRGP, LMSCND     02591400
ISN 0063          COMMON   LMSCTX, LMSECT, LMSS, LMSSTN, LMTBL2, LMTHND, LMTRAN      02591500
ISN 0064          COMMON   LMTRGP, LMTRRT, LMTRSG, LMTRTP, LMTSRT, LMUL, LMVSEG      02591600
            C  PHYSICAL CONSTANTS                                                    02591700
ISN 0065          COMMON   ABTEMP, BTUFLB, CP, FLBBTU, FLBHP, FPSMPH, FTIN, GRACC    02591800
ISN 0066          COMMON   HVH2O, MPHFPS, NUAIR, PI, PR, RDRYAR, RHOCP, RHOMAS       02591900
ISN 0067          COMMON   RHOWHT, SAINHG, SAPSI, STEFAN, THCON, TONLB, VISAIR       02592000
ISN 0068          COMMON   WGCONS, WTBTUS                                            02592100
            C  SECTION VARIABLES  ( LMSECT )                                         02592200
ISN 0069          COMMON   AHIGHS(140), ALOWS(140), BCS(140), BS(140), CEPS(140)     02592300
ISN 0070          COMMON   CENS(140), DQDTS(140), MNQS(140), MXQS(140), NTQPS        02592400
ISN 0071          COMMON   OMEGS(140), QS(140), QSAVES(140), QSMX(140), QSMN(140)    02592500
ISN 0072          COMMON   SUMQNS(140), SUMQPS(140), TABL9, TABL10, TABL11, TABL12   02592600
ISN 0073          COMMON   TABL13, TABL20, TABL21, VHIGHS(140), VLOWS(140)           02592700
            C    SECTION + TWO  (LMSECT+2)                                           02592800
ISN 0074          COMMON   NDSS                                                      02592900
            C    SECTION * ESTIMATED AVERAGE OF 3 LOOPS THROUGH SECTION ( LMLPLK )   02593000
ISN 0075          COMMON   LKAN                                                      02593100
            C    SECTION EXTERNAL IDENTIFICATION NUMBERS                             02593200
ISN 0076          COMMON   TABL14                                                    02593300
            C  NODE VARIABLES  ( LMNODE )                                            02593400
ISN 0077          COMMON   TABL1, TABL15, TABL16, TABL17, TABL18, TABL22, TABL23     02593500
ISN 0078          COMMON   TABL45, TYPTND                                            02593600
            C    NODE EXTERNAL IDENTIFICATION NUMBERS                                02593700
ISN 0079          COMMON   TABL19                                                    02593800
            C  AERODYNAMIC NODE VARIABLES  (LMTBL2)                                  02593900
ISN 0080          COMMON   TABL2                                                     02594000
            C  AERODYNAMIC JUNCTION COEFFICIENTS ( LMCOND )                          02594100
ISN 0081          COMMON   COAEND(950)                                               02594200
            C  THERMODYNAMIC NODE VARIABLES  ( LMTHND )                              02594300
ISN 0082          COMMON   HAVGTN(140), HUMTN(140), TAVGTN(140), TDBTN(140)          02594400
            C    THERMODYNAMIC NODES BY NUMBER OF SECTIONS CONNECTED TO A NODE       02594500
            C    ( LMTHND X LMSCND )                                                 02594600
ISN 0083          COMMON   EMHBTN(140,5), EMTBTN(140,5), FLOBTN(140,5)               02594700
            C  LOOP VARIABLES  ( LMNLOP )                                            02594800
ISN 0084          COMMON   DQDTLP(75), OMEGLP(75), QERRLP(75), QLP(75)               02594900
            C  AERODYNAMIC MATRIX OF COEFFICIENTS - ARRAY SIZE ESTIMATED AT          02595000
            C  APPROXIMENTLY 0.05*LMSECT**2  (LMBLP)                                 02595100
ISN 0085          COMMON   BLP(1000)                                                 02595200
            C  LINE SEGMENT VARIABLES  ( LMLSEG )                                    02595300
ISN 0086          COMMON   ALS(90), CILS(90), CBNLS(90), CBPLS(90), CFNLS(90)        02595400
ISN 0087          COMMON   CFPLS(90), DBTLS(90), DTDELS(90), DTDMLS(90), DTHELS(90) 02595500
ISN 0088          COMMON   DTHMLS(90), DTWELS(90), DTWMLS(90), EPSLS(90), FFFLS(90) 02595600
ISN 0089          COMMON   FLS(90), LLS, LLSS, NAMLS(90,9), NTRNLS, NUMLS            02595700
ISN 0090          COMMON   PDRYLS(90), PERMLS(90), RELS(90), RNFLS(90), RPRMLS(90)  02595800
ISN 0091          COMMON   SURLSS(90), TABL3, TABL4, TABL8, THCNLS(2,90)             02595900
ISN 0092          COMMON   THDFLS(2,90), TSNKLS(90), TYPLS, VOLLSS(90)              02596000
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                C    LINE SEGMENT BY NUMBER OF TRAINS IN LINE SEGMENT (LMLSEG X LMTRSG) 02596100
ISN 0093             COMMON   TRNNLS                                                   02596200
                C    LINE SEGMENT BY TWICE THE NUMBER OF TRAINS IN A LINE SEGMENT       02596300
                C    (LMLSEG X 2*LMTRSG)                                                02596400
ISN 0094             COMMON   TRNDLS(90,16)                                             02596500
                C  VENTILATION SHAFT SEGMENT VARIABLES  ( LMVSEG )                      02596600
ISN 0095             COMMON   AGVS(60), AVS(60), EXVOVS, FDIRVS(60), FPMXVS(60)         02596700
ISN 0096             COMMON   FPMNVS(60), FTOFVS, FTONVS, FTYPVS, LVS, LVSS             02596800
ISN 0097             COMMON   NAMVS(60,9), MNFPVS(60), MXFPVS(60), NUMVS, REVS(60)      02596900
ISN 0098             COMMON   RNFVS(60), STAKVS(60), SURVSS(60), TABL5, TABL6, TYPVS    02597000
ISN 0099             COMMON   VOLVSS(60), VOMXVS(60)                                    02597100
                C  SUBSEGMENT VARIABLES (LINE AND VENT SHAFT SUBSEGMENT)  (LMSS)        02597200
ISN 0100             COMMON   DERHSS(300), DERTSS(300), EMTBSS(300), EMTFSS(300)        02597300
ISN 0101             COMMON   EMHBSS(300), EMHFSS(300), FBSS(300), FFSS(300)            02597400
ISN 0102             COMMON   FLOBSS(300), FLOFSS(300), HRMN(300), HRMX(300)            02597500
ISN 0103             COMMON   HSUMSS(300), HTRNSS(300), HTMPSS(300), HTSMSS(300)        02597600
ISN 0104             COMMON   HUMSS(300), LHLTSS, LSUMSS, MNHP(300), MNTDB(300)         02597700
ISN 0105             COMMON   MNTWB(300), MXHR(300), MXTDB(300), MXTWB(300)             02597800
ISN 0106             COMMON   QERHSS(300), QERTSS(300), QSMXSS(300), QSUMSS(300)        02597900
ISN 0107             COMMON   SHLTSS(300), SHRSS(300), SHUXSS(300), STDBSS(300)         02598000
ISN 0108             COMMON   STDNSS(300), STDPSS(300), STWBSS(300), TABL7, TDBSS(300) 02598100
ISN 0109             COMMON   TDBMN(300), TDBMX(300), TSFSS(300), TABL44, TTMPSS(300)  02598200
ISN 0110             COMMON   TWBSS(300), TWBMN(300), TWBMX(300), VOLSS(300)            02598300
                C  LINE SUBSEGMENT VARIABLES  (LMLSS)                                   02598400
ISN 0111             COMMON   EXDTDB, LACLSS, LHLSS, SACLSS(250), SHLSS(250)            02598500
                C    LINE SUBSEGMENT BY TRAIN ROUTE  (LMLSS X LMTRRT)                   02598600
ISN 0112             COMMON   ITNLSS                                                    02598700
                C  ZONE CLUSTER VARIABLES                                               02598800
ISN 0113             COMMON   TYPCL                                                     02598900
                C  SUBWAY VEHICLE TYPE VARIABLES  ( LMTRTP )                            02599000
ISN 0114             COMMON   ACACCV(3), ACCV(3), ACDECV(3), ARACCV(3), ARDECV(3)       02599100
ISN 0115             COMMON   AV(3), CD3VOV(3), CDFVOV(3), CHPR1V(3), CHPR2V(3)         02599200
ISN 0116             COMMON   COAMP(3,4), COAMPL(3,6), COATEV(3), COBTEV(3), CORMV(3,3)02599300
ISN 0117             COMMON   COTEV(3,4), DECAV(3), DECBV(3), DECV(3), DECVIV(3)        02599400
ISN 0118             COMMON   DIACGV(3), DIDCGV(3), EMISAG(3), EMISDG(3), LAMDAV, LHREV02599500
ISN 0119             COMMON   LV, MCPGAV, MCPGDV, MOTORV, NCARV, NOPTV(3), NPCARV       02599600
ISN 0120             COMMON   PERMV(3), REGENV(3)                                       02599700
ISN 0121             COMMON   RE1M(3), RE2M(3), RE3M(3), RRACC(3), SHREV(3), SLOPEV(3) 02599800
ISN 0122             COMMON   SP1(3), SP2(3), SRE1M(3), SRE2M(3), TESP1(3)              02599900
ISN 0123             COMMON   TIACCV(3), TIDECV(3), UCHPRV(3), U2M(3), U3M(3), WV(3)   02600000
                C   UNDERPLATFORM EXHAUST VARIABLES                                     02600100
ISN 0124             COMMON   EESUX, EFMUX, OPTLX, UMAXUX                               02600200
                C  ROUTE VARIABLES  ( LMTRRT )                                          02600300
ISN 0125             COMMON   COPTRT, NTSRT, ORIGRT(6), UMINRT(6)                       02600400
                C    DISPATCHER VARIABLES  ( LMTRRT ) AND ( LMTRGP X LMTRRT )           02600500
ISN 0126             COMMON   GRHDWY, GRTYPV, JGROUP, NGRV, NMTRGR, NTIMTR(6)           02600600
ISN 0127             COMMON   NTRGR, NUMBTR                                             02600700
                C    TRACK SECTION VARIABLES  ( LMTSRT X LMTRRT )                       02600800
ISN 0128             COMMON   DWLTS, FSTS(260,6), GRDTS(260,6), NPETTS                  02600900
ISN 0129             COMMON   NSEGTS, RADTS(260,6), UMXTS(260,6)                        02601000
                C    EXPLICIT TRAIN PERFORMANCE VARIABLES  ( LMEXPD X LMTRRT )          02601100
ISN 0130             COMMON   NEXPDP, QGRIDV(201,6), SPEEDV(201,6), TIMEV               02601200
                C  OPERATIONAL TRAIN VARIABLES  ( LMTRAN )                              02601300
ISN 0131             COMMON   AMPV(30), AMPLV(30), ANVV(30), DGRDCV(30), DPV, DRAGV(30)02601400
ISN 0132             COMMON   DUDTV(30), INDEX, IROTEV, ITYPV, MODEV, NTSV              02601500
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ISN 0133          COMMON   NTSV2, QACCV(30), QDECV(30), QERACV(30), QERDCV(30)      02601600
ISN 0134          COMMON   QTRPF(30), RGSUMV(30), RMHTV(30), RSISTV(30), TAAVGV(30) 02601700
ISN 0135          COMMON   TEV(30), TGACCV(30), TGDECV(30), TLPSV, TNUMV, TSTRTV    02601800
ISN 0136          COMMON   TWAVGV(30), UV(30), WPATV(30), XLASTV(30), XV(30)        02601900
            C  FAN TYPE VARIABLES  ( LMFNTP )                                       02602000
ISN 0137          COMMON   CFMHFT(4), CFMLFT(4), FN1IFT(4), FN2IFT(4), FN3IFT(4)   02602100
ISN 0138          COMMON   FN4IFT(4), FN1OFT(4), FN2OFT(4), FN3OFT(4), FN4OFT(4)   02602200
ISN 0139          COMMON   TIMFT(4)                                                02602300
            C  UNSTEADY HEAT LOAD VARIABLES  ( LMUL )                               02602400
ISN 0140          COMMON   HLLUL(10), HLSUL(10), LSSUL, LTONUL(10), LTOFUL(10)     02602500
            C  PATRON CHARACTERISTICS                                               02602600
ISN 0141          COMMON   PATWHT                                                  02602700
            C  PRINT GROUP VARIABLES  ( LMPRGP )                                    02602800
ISN 0142          COMMON   GINTPR, GRABBP, GRSUM, NPRGR                            02602900
            C                                                                       02603000
ISN 0143          EQUIVALENCE  (ND(1), NDS(2), NDSS(3))                            02603100
            C                                                                       02603200
            C                                                                       02603300
            C                                                                       02603400
            C*****THIS SUBROUTINE IS THE DRIVING PORTION OF THE SES TRAIN           02603500
            C*****PERFORMANCE SUBPROGRAM. IT HAS THREE MAJOR PARTS. THEY ARE        02603600
            C***** 1) THE TRAIN 'DISPATCHER' WHICH PLACES TRAINS IN OPERATION ON ALL02603700
            C*****    ROUTES AND REMOVES FROM OPERATION ANY TRAINS THAT HAVE GONE   02603800
            C*****    BEYOND THE LAST TRACK SECTION OF THEIR ROUTE                  02603900
            C***** 2) THE IMPLICIT TRAIN PERFORMANCE WHICH COMPUTES THE LOCATION,   02604000
            C*****    SPEED, ACCELERATION, ETC. OF EACH TRAIN WHEN THE IMPLICIT     02604100
            C*****    TRAIN PERFORMANCE OPTION IS SPECIFIED (TPOPT=1)               02604200
            C***** 3) THE EXPLICIT TRAIN PERFORMANCE WHICH COMPUTES THE LOCATION,   02604300
            C*****    SPEED, ACCELERATION, ETC. OF EACH TRAIN WHEN THE EXPLICIT     02604400
            C*****    TRAIN PERFORMANCE OPTION IS SPECIFIED (TPOPT=2,3)             02604500
            C                                                                       02604600
            C*****TRAIN OPERATING MODES                                             02604700
            C***** IMPLICIT TRAIN PERFORMANCE - TPOPT=1                             02604800
            C*****    MODE 0 = STOPPED                                              02604900
            C*****         1 = MAINTAINING CONSTANT SPEED                           02605000
            C*****         2 = ACCELERATING AT FULL AVAILABLE POWER                 02605100
            C*****         3 = BRAKING (DECELEPATION RATE VARIES LINEARLY WITH      02605200
            C*****                     RESPECT TO TRAIN SPEED)                      02605300
            C*****         4 = BRAKING (CONSTANT DECELERATION RATE)                 02605400
            C*****         5 = COASTING                                             02605500
            C*****         6 = MAINTAINING MINIMUM SPEED IN A TRACK SECTION WHERE   02605600
            C*****             COASTING IS PERMITTED                                02605700
            C*****         7 = ATTEMPTING TO MAINTAIN CONSTANT MINIMUM SPEED IN A   02605800
            C*****             TRACK SECTION WHERE COASTING IS PERMITTED            02605900
            C***** EXPLICIT TRAIN PERFORMANCE - HEAT REJECTION COMPUTED - TPOPT=2   02606000
            C*****    MODE 1 = ALL ACTIVITIES                                       02606100
            C***** EXPLICIT TRAIN PERFORMANCE - HEAT REJECTION INPUT - TPOPT=3      02606200
            C*****    MODE 1 = ALL ACTIVITIES                                       02606300
            C                                                                       02606400
            C*****INITIALIZE NUMBER OF TRAINS IN EACH SEGMENT TO ZERO               02606500
ISN 0144          IF (NLS) 1280,30,10                                              02606600
ISN 0145       10 DO 20 ILS=1,NLS                                                  02606700
ISN 0146       20 NTRNLS(ILS)=0                                                    02606800
            C                                                                       02606900
            C                                                                       02607000
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                C*****DISPATCHER - FIRST 'REMOVE', THEN 'DISPATCH'                  02607100
                C                                                                   02607200
                C                                                                   02607300
                C*****SKIP DISPATCHER IF NOT TIME FOR COMPLETE TRAIN EVALUATION     02607400
ISN 0147           30 IF (NTIME-TRTIME) 240,40,40                                   02607500
                C*****IF NO TRAINS ARE OPERATING THEN NONE MUST BE REMOVED          02607600
ISN 0148           40 IF (NTRAN) 150,150,50                                         02607700
                C*****LOOP OVER OPERATING TRAINS CHECKING IF THEY SHOULD BE REMOVED 02607800
                C*****INITIALIZE INDEX OF OPERATING TRAINS                          02607900
ISN 0149           50 JTRAIN=0                                                      02608000
                C*****INCREMENT INDEX OF OPERATING TRAINS                           02608100
ISN 0150           60 JTRAIN=JTRAIN+1                                               02608200
                C*****FIND TRAIN NUMBER, ROUTE, AND NUMBER OF TRACK SECTIONS IN ROUTE 02608300
ISN 0151           70 NUMV=INDEX(JTRAIN)                                            02608400
ISN 0152              IROUTE=IROTEV(NUMV)                                           02608500
ISN 0153              NTS=NTSRT(IROUTE)                                             02608600
                C*****REMOVE TRAIN FROM OPERATION WHEN FRONT IS BEYOND LAST T.S.    02608700
ISN 0154              IF (XV(NUMV)-FSTS(NTS,IROUTE)) 80,80,100                      02608800
ISN 0155           80 GO TO (140,90,90), TROPT                                      02608900
                C*****REMOVE FROM OPERATION TRAINS THAT HAVE PASSED LAST POINT      02609000
                C*****IN SPEED-TIME PROFILE                                         02609100
ISN 0156           90 IF (NEXPOP(IROUTE)-OPV(NUMV)) 100,100,140                     02609200
                C*****REMOVE TRAIN FROM OPERATION - REDUCE INDEX OF ACTIVE TRAINS   02609300
                C*****AND RE-PACK ARRAY 'INDEX'                                     02609400
ISN 0157          100 IF (JTRAIN-LMTRAN) 110,130,130                                02609500
ISN 0158          110 I1=LMTRAN-1                                                   02609600
ISN 0159              DO 120 I=JTRAIN,I1                                            02609700
ISN 0160          120 INDEX(I)=INDEX(I+1)                                           02609800
                C*****THIS ENTRY MEANS THAT THE ENTRIES IN INDEX FROM INDEX(NTRAN+1) 02609900
                C*****TO INDEX(LMTRAN) CONTAIN THE 'NUMV' THAT ARE AVAILABLE FOR REUSE 02610000
ISN 0161              INDEX(LMTRAN)=NUMV                                            02610100
                C*****DECREASE THE NUMBER OF OPERATING TRAINS BY ONE                02610200
ISN 0162          130 NTRAN=NTRAN-1                                                 02610300
                C*****CHECK IF TRAIN REMOVED WAS LAST TRAIN NEEDING REMOVAL CHECK   02610400
ISN 0163              IF (JTRAIN-NTRAN) 70,70,150                                   02610500
                C*****CHECK IF ALL TRAINS HAVE BEEN CHECKED FOR REMOVAL             02610600
ISN 0164          140 IF (JTRAIN-NTRAN) 60,150,150                                  02610700
                C*****TRAIN DISPATCHING FOR ALL TRAIN ROUTES                        02610800
ISN 0165          150 DO 230 IROUTE=1,NTRRTE                                        02610900
ISN 0166              IGROUP=JGROUP(IROUTE)                                         02611000
                C*****CHECK IF TRAIN GROUP INFORMATION FOR ROUTE HAS BEEN EXHAUSTED 02611100
ISN 0167              IF (IGROUP-NGRV(IROUTE)) 160,160,230                          02611200
                C*****CHECK IF TIME TO DISPATCH NEXT TRAIN ON THIS ROUTE            02611300
ISN 0168          160 IF (NTIME-NTIMTR(IROUTE)) 230,170,170                         02611400
                C*****PLACE A NEW TRAIN INTO OPERATION                              02611500
ISN 0169          170 NTRAN=NTRAN+1                                                 02611600
                C*****CHECK IF AN ATTEMPT IS BEING MADE TO PLACE TOO MANY TRAINS IN 02611700
                C*****OPERATION AT ONCE - IF SO, DO NOT PLACE TRAIN IN OPERATION AND 02611800
                C*****HOLD ALL DISPATCHING ON THIS ROUTE FOR ONE HEADWAY            02611900
ISN 0170              IF (NTRAN-LMTRAN) 190,190,180                                 02612000
ISN 0171          180 CALL SIMERR (1)                                               02612100
ISN 0172              NTRAN=NTRAN-1                                                 02612200
ISN 0173              NTIMTR(IROUTE)=NTIME+GRHDWY(IGROUP,IROUTE)                    02612300
ISN 0174              GO TO 230                                                     02612400
                C*****FIND INTERNAL NUMBER OF NEWLY DISPATCHED TRAIN                02612500
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ISN 0175        190 NUMV=INDEX(NTRAN)                                          02612600
              C*****INCREMENT TOTAL NUMBER OF TRAINS THAT HAVE ENTERED SYSTEM  02612700
ISN 0176            NUMBTR=NUMBTR+1                                            02612800
              C*****ASSIGN TRAIN EXTERNAL NUMBER - STORED ALPHAMERICALLY       02612900
ISN 0177            CALL ALCHAR (NUMBTR,TNUMV(NUMV))                           02613000
              C*****INCREMENT NUMBER OF TRAINS DISPATCHED FOR THIS GROUP       02613100
ISN 0178            NMTRGR(IROUTE)=NMTRGR(IROUTE)+1                            02613200
              C*****CHECK IF ALL TRAINS IN THIS GROUP HAVE BEEN DISPATCHED     02613300
ISN 0179            IF (NMTRGR(IROUTE)-NTRGR(IGROUP,IROUTE)) 210,200,200       02613400
ISN 0180        200 JGROUP(IROUTE)=JGROUP(IROUTE)+1                            02613500
              C*****INITIALIZE NUMBER OF TRAINS DISPATCHED IN NEW GROUP        02613600
ISN 0181            NMTRGR(IROUTE)=0                                           02613700
              C*****COMPUTE TIME OF NEXT TRAIN DISPATCH FOR THIS ROUTE         02613800
ISN 0182        210 KGROUP=JGROUP(IROUTE)                                      02613900
ISN 0183            NTIMTR(IROUTE)=NTIME+GRHDWY(KGROUP,IROUTE)                 02614000
              C*****INITIALIZE OPERATIONAL TRAIN PARAMETERS ASSUMING IMPLICIT TRAIN 02614100
              C*****PERFORMANCE                                                02614200
ISN 0184            IROTEV(NUMV)=IROUTE                                        02614300
ISN 0185            XV(NUMV)=ORIGRT(IROUTE)                                    02614400
ISN 0186            TEV(NUMV)=0.0                                              02614500
ISN 0187            AMPV(NUMV)=0.0                                             02614600
ISN 0188            AMPLV(NUMV)=0.0                                            02614700
ISN 0189            UV(NUMV)=0.0                                               02614800
ISN 0190            TSTRTV(NUMV)=0                                             02614900
ISN 0191            ITYPV(NUMV)=GRTYPV(IGROUP,IROUTE)                          02615000
ISN 0192            ITYP=ITYPV(NUMV)                                           02615100
ISN 0193            WPATV(NUMV)=NPETTS(1,IROUTE)*PATWHT                        02615200
ISN 0194            DUDTV(NUMV)=0.0                                            02615300
ISN 0195            MODEV(NUMV)=0                                              02615400
ISN 0196            TSTRTV(NUMV)=0                                             02615500
ISN 0197            QCRDCV(NUMV)=0.0                                           02615600
ISN 0198            QERACV(NUMV)=0.0                                           02615700
ISN 0199            TGACCV(NUMV)=TIACCV(ITYP)                                  02615800
ISN 0200            TGDECV(NUMV)=TIDECV(ITYP)                                  02615900
ISN 0201            TLPSV(NUMV)=NDELT                                          02616000
ISN 0202            NTSV(NUMV)=2                                               02616100
ISN 0203            NTSV2(NUMV)=2                                              02616200
ISN 0204            DRAGV(NUMV)=0.0                                            02616300
ISN 0205            QACCV(NUMV)=0.0                                            02616400
ISN 0206            QDECV(NUMV)=0.0                                            02616500
ISN 0207            RMHTV(NUMV)=0.0                                            02616600
ISN 0208            QTRPE(NUMV)=SHREV(ITYP)                                    02616700
ISN 0209            RGSUMV(NUMV)=0.0                                           02616800
ISN 0210            TAAVGV(NUMV)=0.0                                           02616900
ISN 0211            TWAVGV(NUMV)=0.0                                           02617000
ISN 0212            ANVV(NUMV)=0.0                                             02617100
ISN 0213            GO TO (230,220,220), TPOPT                                 02617200
              C*****INITIALIZE OR MODIFY OPERATIONAL TRAIN PARAMETERS FOR EXPLICIT 02617300
              C*****TRAIN PERFORMANCE                                          02617400
ISN 0214        220 MODEV(NUMV)=1                                              02617500
ISN 0215            DPV(NUMV)=1                                                02617600
ISN 0216            UV(NUMV)=SPEEDV(1,IROUTE)                                  02617700
ISN 0217            XLASTV(NUMV)=ORIGRT(IROUTE)                                02617800
ISN 0218            DUDTV(NUMV)=(SPEEDV(1,IROUTE)-SPEEDV(2,IROUTE))/(TIMEV(1,IROUTE)-T02617900
                   1IMEV(2,IROUTE))*100.0                                      02618000
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ISN 0219        230 CONTINUE                                                    02618100
              C*****IF NO TRAINS ARE OPERATIONAL THEN NO PERFORMANCE MUST BE COMPUTED 02618200
ISN 0220        240 IF (NTRAN) 1280,1270,250                                    02618300
ISN 0221        250 GO TO (260,1090,1090), TPCPT                                02618400
              C                                                                 02618500
              C                                                                 02618600
              C*****IMPLICIT TRAIN PERFORMANCE                TPCPT = 1         02618700
              C                                                                 02618800
              C                                                                 02618900
              C*****LOOP OVER ALL OPERATING TRAINS                              02619000
ISN 0222        260 DO 1080 ITRAN=1,NTRAN                                       02619100
              C*****FIND TRAIN NUMBER, TYPE, ROUTE, AND TRACK SECTION           02619200
ISN 0223              NUMV=INDEX(ITRAN)                                         02619300
ISN 0224              ITYP=ITYPV(NUMV)                                          02619400
ISN 0225              IROUTE=IROTEV(NUMV)                                       02619500
ISN 0226              JTS=NTSV(NUMV)                                            02619600
              C*****BRANCH ON MODE OF TRAIN                                     02619700
ISN 0227              NUMY1=MODEV(NUMV)+1                                       02619800
ISN 0228              GO TO (270,310,310,460,460,560,680,760), NUMY1            02619900
              C                                                                 02620000
              C*****TRAIN IS STOPPED - MODE=0                                   02620100
              C                                                                 02620200
              C*****FIND TRAIN POSITION, AND ITS GRADE AND CURVE RESISTANCE     02620300
ISN 0229        270 CALL LOCATE (NUMV,ITYP,IROUTE,RG,RC)                        02620400
              C*****CHECK IF TIME TO RESTART TRAIN                              02620500
ISN 0230              IF (TSTRTV(NUMV)-NTIME) 280,280,1080                      02620600
              C*****RESTART THE TRAIN                                           02620700
ISN 0231        280 MODEV(NUMV)=2                                               02620800
              C*****FIND TRAIN TOTAL WEIGHT, GRADE AND CURVE RESISTANCES AND SUM OF 02620900
              C*****GRADE CURVE, AND ROLLING RESISTANCES                        02621000
ISN 0232              WTRN=WV(ITYP)+WPATV(NUMV)                                 02621100
ISN 0233              RG=RG*WTRN                                                02621200
ISN 0234              RC=RC*WTRN/TONLB                                          02621300
ISN 0235              RSISTV(NUMV)=CORMV(ITYP,1)*WTRN+CORMV(ITYP,2)+RG+RC       02621400
              C*****FIND TRACTIVE EFFORT AVAILABLE                              02621500
ISN 0236              TEV(NUMV)=TORQUE(0.0,ITYP)                                02621600
              C*****FIND ACCELERATION TRAIN IS CAPABLE OF                       02621700
ISN 0237              DUDTV(NUMV)=(TEV(NUMV)*MOTORV(ITYP)-RSISTV(NUMV))/(WV(ITYP)*RRACC(02621800
                     1ITYP)+WPATV(NUMV)/GRACC)                                  02621900
              C*****CHECK IF MAXIMUM ACCELERATION ALLOWED WOULD BE EXCEEDED     02622000
ISN 0238              IF (DUDTV(NUMV)-ACCV(ITYP)) 300,300,290                   02622100
              C*****SET ACCELERATION TO MAXIMUM ALLOWED AND RECOMPUTE TRACTIVE EFFORT 02622200
ISN 0239        290 DUDTV(NUMV)=ACCV(ITYP)                                      02622300
ISN 0240              TEV(NUMV)=(DUDTV(NUMV)*(WV(ITYP)*RRACC(ITYP)+WPATV(NUMV)/GRACC)+RS02622400
                     1ISTV(NUMV))/MOTORV(ITYP)                                  02622500
              C*****COMPUTE MOTOR CURRENT AND LINE CURRENT                      02622600
ISN 0241        300 AMPV(NUMV)=AMPERE(TEV(NUMV),ITYP)                           02622700
ISN 0242              AMPLV(NUMV)=AMPERL(0.0,TEV(NUMV),ITYP)                    02622800
ISN 0243              GO TO 1070                                                02622900
              C                                                                 02623000
              C*****TRAIN IS MAINTAINING CONSTANT SPEED OR ACCELERATING - MODE=1,2 02623100
              C                                                                 02623200
              C*****APPROXIMATE NEW SPEED USING LAST VALUE OF ACCELERATION      02623300
ISN 0244        310 UNEW=UV(NUMV)+DUDTV(NUMV)*DELT                              02623400
ISN 0245              UAVG=0.5*(UV(NUMV)+UNEW)                                  02623500
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                C*****FIND TRACTIVE EFFORT AVAILABLE                                    02623600
ISN 0246              TE=TCROLS(UAVG,ITYP)                                              02623700
ISN 0247              TEV(NUMV)=TE                                                      02623800
ISN 0248              IF (MODEV(NUMV)-1) 1280,320,390                                   02623900
                C                                                                       02624000
                C*****MAINTAINING CONSTANT SPEED  -  MODE=1                             02624100
                C                                                                       02624200
                C*****COMPUTE T.E. REQUIRED TO MAINTAIN SPEED                           02624300
ISN 0249          320 TEREQ=RSISTV(NUMV)/MOTORV(ITYP)                                   02624400
                C*****CHECK IF AVAILABLE T.E. IS GREATER THAN REQUIRED T.E.             02624500
ISN 0250              IF (TE-TEREQ) 330,340,340                                         02624600
                C*****SWITCH TO ACCELERATION MODE TO USE ALL AVAILABLE POWER - MODE=2   02624700
ISN 0251          330 MODEV(NUMV)=2                                                     02624800
ISN 0252              GO TO 390                                                         02624900
                C*****ENOUGH POWER IS AVAILABLE - COMPUTE MOTOR CURRENT AND LINE CURRENT02625000
ISN 0253          340 AMPV(NUMV)=AMPERE(TEREQ,ITYP)                                     02625100
ISN 0254              AMPLV(NUMV)=AMPERL(UAVG,TEREQ,ITYP)                               02625200
ISN 0255              TEV(NUMV)=TEREQ                                                   02625300
                C*****COMPUTE NEW TRAIN LOCATION                                        02625400
ISN 0256              XV(NUMV)=XV(NUMV)+UV(NUMV)*DELT                                   02625500
                C*****CHECK IF TRAIN HAS EXCEEDED CURRENT SPEED RESTRICTION             02625600
ISN 0257              IF (UNEW-ABS(UMXTS(JTS,IROUTE))+0.01) 370,350,350                 02625700
                C*****CHECK IF TRAIN HAS JUST ENTERED TRACK SECTION WHERE COASTING IS   02625800
                C*****PERMITTED WHILE RUNNING AT CONSTANT SPEED                         02625900
ISN 0258          350 IF (UMXTS(JTS,IROUTE)) 360,820,820                                02626000
                C*****SWITCH TO COASTING MODE - MODE=5                                  02626100
ISN 0259          360 MODEV(NUMV)=5                                                     02626200
ISN 0260              TEV(NUMV)=0.0                                                     02626300
ISN 0261              AMPV(NUMV)=0.0                                                    02626400
ISN 0262              AMPLV(NUMV)=0.0                                                   02626500
ISN 0263              GO TO 820                                                         02626600
                C*****TRAIN IS BELOW MAXIMUM SPEED ALLOWED IN THIS TRACK SECTION. SWITCH02626700
                C*****TO ACCELERATION ONLY IF TRAIN IS BEYOND THE TRACK SECTION THAT IT 02626800
                C*****BRAKED FOR, OR, IF IT IS IN THE TRACK SECTION THAT IT BRAKED FOR  02626900
                C*****IT IS GOING TOO SLOW                                              02627000
ISN 0264          370 IF (NTSV(NUMV)-NTSV2(NUMV)) 820,380,380                           02627100
ISN 0265          380 MODEV(NUMV)=2                                                     02627200
ISN 0266              GO TO 820                                                         02627300
                C                                                                       02627400
                C*****ACCELERATING MODE - MODE=2                                        02627500
                C                                                                       02627600
ISN 0267          390 DUDTV(NUMV)=(TE*MOTORV(ITYP)-RSISTV(NUMV))/(WV(ITYP)*RRACC(ITYP)+W02627700
                     1PATV(NUMV)/GRACC)                                                 02627800
                C*****CHECK IF ACCELERATION EXCEEDS MAXIMUM ALLOWABLE                   02627900
ISN 0268              IF (DUDTV(NUMV)-ACCV(ITYP)) 410,410,400                           02628000
                C*****SET ACCELERATION TO MAXIMUM ALLOWED AND RECOMPUTE TRACTIVE EFFORT 02628100
ISN 0269          400 DUDTV(NUMV)=ACCV(ITYP)                                            02628200
ISN 0270              TEV(NUMV)=(DUDTV(NUMV)*(WV(ITYP)*RRACC(ITYP)+WPATV(NUMV)/GRACC)+RS02628300
                     1ISTV(NUMV))/MOTORV(ITYP)                                          02628400
                C*****COMPUTE MOTOR CURRENT AND LINE CURRENT                            02628500
ISN 0271          410 AMPV(NUMV)=AMPERE(TEV(NUMV),ITYP)                                 02628600
ISN 0272              AMPLV(NUMV)=AMPERL(UAVG,TEV(NUMV),ITYP)                           02628700
                C*****COMPUTE NEW TRAIN SPEED                                           02628800
ISN 0273              UNEW=UV(NUMV)+DUDTV(NUMV)*DELT                                    02628900
                C*****COMPARE TRAIN SPEED TO MAXIMUM ALLOWED IN CURRENT TRACK SECTION   02629000
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ISN 0274          IF (UNEW-ABS(UMXTS(JTS,IROUTE))) 420,430,430                  02629100
            C*****CONTINUE ACCELERATION                                         02629200
            C*****COMPUTE NEW TRAIN LOCATION                                    02629300
ISN 0275        420 XV(NUMV)=XV(NUMV)+0.5*DELT*(UV(NUMV)+UNEW)                  02629400
            C*****STORE NEW TRAIN SPEED                                         02629500
ISN 0276          UV(NUMV)=UNEW                                                 02629600
ISN 0277          GO TO 820                                                     02629700
            C*****COMPUTE NEW TRAIN LOCATION                                    02629800
ISN 0278        430 DUDTV(NUMV)=0.0                                             02629900
ISN 0279          XV(NUMV)=XV(NUMV)+0.5*DELT*(UV(NUMV)+ABS(UMXTS(JTS,IROUTE)))  02630000
            C*****SET TRAIN SPEED EQUAL TO CURRENT OR ANTICIPATED SPEED         02630100
            C*****RESTRICTION                                                   02630200
ISN 0280          UV(NUMV)=ABS(UMXTS(JTS,IROUTE))                               02630300
            C*****CHECK IF SWITCH IS TO MAINTAINING CONSTANT SPEED OR COASTING MODE 02630400
ISN 0281          IF (UMXTS(JTS,IROUTE)) 440,450,450                            02630500
            C*****SWITCH TO COASTING MODE - MODE=5                              02630600
ISN 0282        440 MODEV(NUMV)=5                                               02630700
ISN 0283          TEV(NUMV)=0.0                                                 02630800
ISN 0284          AMPV(NUMV)=0.0                                                02630900
ISN 0285          AMPLV(NUMV)=0.0                                               02631000
ISN 0286          GO TO 820                                                     02631100
            C*****SWITCH TO MAINTAINING CONSTANT SPEED MODE - MODE=1            02631200
ISN 0287        450 MODEV(NUMV)=1                                               02631300
            C*****SET TRACK SECTION TRAIN HAS BRAKED FOR TO CURRENT TRACK SECTION 02631400
ISN 0288          NTSV2(NUMV)=JTS                                               02631500
ISN 0289          GO TO 820                                                     02631600
            C                                                                   02631700
            C*****BRAKING MODES - MODE=3,4                                      02631800
            C                                                                   02631900
ISN 0290        460 UNEW=UV(NUMV)+DUDTV(NUMV)*DELT                              02632000
            C*****CHECK IF TRAIN HAS STOPPED                                    02632100
ISN 0291          IF (UNEW) 550,550,470                                         02632200
            C*****CHECK IF GOVERNING SPEED RESTRICTION HAS BEEN MET             02632300
ISN 0292        470 JTS=NTSV2(NUMV)                                             02632400
ISN 0293          IF (UNEW-ABS(UMXTS(JTS,IROUTE))) 430,430,480                  02632500
ISN 0294        480 XV(NUMV)=XV(NUMV)+0.5*DELT*(UV(NUMV)+UNEW)                  02632600
ISN 0295          UV(NUMV)=UNEW                                                 02632700
ISN 0296          IF (MODEV(NUMV)-4) 490,820,820                                02632800
            C*****COMPUTE NEW BRAKING RATE                                      02632900
ISN 0297        490 IF (UNEW-DECV1V(ITYP)) 510,500,500                          02633000
            C*****ABOVE SPEED V1 - VARYING PORTION OF DECELERATION RATE CURVE   02633100
ISN 0298        500 DUDTV(NUMV)=-DECBV(ITYP)-DECAV(ITYP)*UNEW                   02633200
ISN 0299          GO TO 820                                                     02633300
            C*****BELOW SPEED V1 - CONSTANT DECELERATION RATE                   02633400
ISN 0300        510 JTS2=NTSV2(NUMV)                                            02633500
ISN 0301          IF (ABS(UMXTS(JTS2,IROUTE))-0.1) 520,530,530                  02633600
            C*****TRAIN IS STOPPING FOR A STATION                               02633700
            C*****COMPUTE STOPPING TIME AND DECELERATION RATE                   02633800
ISN 0302        520 STTIM=(FSTS(JTS2-1,IROUTE)-XV(NUMV))*2.0/UV(NUMV)           02633900
ISN 0303          IF( STTIM ) 537,537,525                                       02633910 <-- I
ISN 0304        525 DUDTV(NUMV)=-UV(NUMV)/STTIM                                 02634000 <-- C
ISN 0305          GO TO 540                                                     02634100
            C*****TRAIN IS SLOWING FOR A SPEED RESTRICTION                      02634200
            C*****ADJUST STOPPING TIME TO AN INTEGER DELTA T                    02634300
ISN 0306        530 STTIM=(UV(NUMV)-ABS(UMXTS(JTS2,IROUTE)))/DECV(ITYP)         02634400
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ISN 0307          INT=IFIX(STTIM/DELT+C.9999)                                  02634500
ISN 0308          STTIM=FLOAT(INT)*DELT                                        02634600
ISN 0309          IF( STTIM ) 537,537,535                                      02634610 <-- I
ISN 0310      535 DUDTV(NUMV)=(ABS(UMXTS(JTS2,IROUTE))-UV(NUMV))/STTIM         02634700 <-- C
ISN 0311          GO TO 540                                                    02634710
            C**** USE MAXIMUM DECELERATION RATE                                02634720 <-- I
ISN 0312      537 DUDTV(NUMV) = DECV(ITYP)                                     02634730
            C*****SWITCH TO MODE 4                                             02634800
            C*****USE THIS DECELERATION RATE FOR REMAINDER OF BRAKING CYCLE    02634900
ISN 0313      540 MODEV(NUMV)=4                                                02635000
ISN 0314          GO TO 820                                                    02635100
            C*****TRAIN HAS STOPPED                                            02635200
ISN 0315      550 MODEV(NUMV)=0                                                02635300
ISN 0316          DUDTV(NUMV)=0.0                                              02635400
ISN 0317          UV(NUMV)=0.0                                                 02635500
ISN 0318          JTS=NTSV2(NUMV)                                              02635600
ISN 0319          XV(NUMV)=FSTS(JTS,IROUTE)                                    02635700
            C*****COMPUTE TIME OF RESTART                                      02635800
ISN 0320          TSTRTV(NUMV)=NTIME+DWLTS(JTS,IROUTE)                         02635900
ISN 0321          NTSV(NUMV)=NTSV2(NUMV)+1                                     02636000
ISN 0322          TEV(NUMV)=0.0                                                02636100
ISN 0323          AMPV(NUMV)=0.0                                               02636200
ISN 0324          AMPLV(NUMV)=0.0                                              02636300
ISN 0325          QACCV(NUMV)=0.0                                              02636400
ISN 0326          QDECV(NUMV)=0.0                                              02636500
ISN 0327          RMHTV(NUMV)=0.0                                              02636600
            C*****COMPUTE NEW WEIGHT OF PATRONS ON TRAIN                       02636700
ISN 0328          WPATV(NUMV)=WPATV(NUMV)+NPETTS(JTS,IROUTE)*PATWHT            02636800
ISN 0329          GO TO 820                                                    02636900
            C                                                                  02637000
            C*****COASTING MODE - MODE=5                                       02637100
            C                                                                  02637200
            C*****COMPUTE NEW ACCELERATION                                     02637300
ISN 0330      560 DUDTV(NUMV)=-RSISTV(NUMV)/(WV(ITYP)*RRACC(ITYP)+WPATV(NUMV)/GRACC)02637400
            C*****COMPUTE ANTICIPATED SPEED                                    02637500
ISN 0331          UNEW=UV(NUMV)+DUDTV(NUMV)*DELT                               02637600
            C*****IF ANTICIPATED SPEED IS LESS THAN UMIN THEN SWITCH TO ANOTHER MODE02637700
ISN 0332          IF (UNEW-UMINRT(IROUTE)) 570,570,600                         02637800
ISN 0333      570 UNEW=UMINRT(IROUTE)                                          02637900
            C*****COMPUTE NEW TRAIN LOCATION AND STORE NEW TRAIN SPEED         02638000
ISN 0334          XV(NUMV)=XV(NUMV)+0.5*DELT*(UV(NUMV)+UNEW)                   02638100
ISN 0335          UV(NUMV)=UNEW                                                02638200
ISN 0336          DUDTV(NUMV)=0.0                                              02638300
ISN 0337          IF (COPTRT(IROUTE)) 1280,590,580                             02638400
            C*****SWITCH TO ACCELERATING MODE - MODE=2                         02638500
ISN 0338      580 MODEV(NUMV)=2                                                02638600
ISN 0339          GO TO 820                                                    02638700
            C*****SWITCH TO COASTING CONSTANT SPEED MODE - MODE=6              02638800
ISN 0340      590 MODEV(NUMV)=6                                                02638900
ISN 0341          GO TO 640                                                    02639000
            C*****IF ANTICIPATED SPEED IS GREATER THAN MAXIMUM ALLOWED THEN MAINTAIN02639100
            C*****MAXIMUM SPEED                                                02639200
ISN 0342      600 IF (UNEW-ABS(UMXTS(JTS,IROUTE))) 620,610,610                 02639300
ISN 0343      610 UNEW=ABS(UMXTS(JTS,IROUTE))                                  02639400
            C*****FIND 'NEGATIVE' TRACTIVE' EFFORT (BRAKING EFFORT) REQUIRED TO KEEP02639500
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                C*****TRAIN FROM GOING TOO FAST                                  02639600
ISN 0344              TEV(NUMV)=RSISTV(NUMV)/MOTORV(ITYP)                        02639700
ISN 0345              DUDTV(NUMV)=0.0                                            02639800
ISN 0346              GO TO 630                                                  02639900
ISN 0347          620 TEV(NUMV)=0.0                                              02640000
                C*****COMPUTE NEW TRAIN LOCATION AND SPEED                       02640100
ISN 0348          630 XV(NUMV)=XV(NUMV)+0.5*DELT*(UV(NUMV)+UNEW)                 02640200
ISN 0349              UV(NUMV)=UNEW                                              02640300
                C*****CHECK IF TRAIN HAS LEFT COASTING TRACK SECTION             02640400
ISN 0350          640 IF (UMXTS(JTS,IROUTE)) 820,650,650                         02640500
                C*****TRAIN CAN NO LONGER COAST - SWITCH TO ANOTHER MODE          02640600
ISN 0351          650 IF (UNEW-ABS(UMXTS(JTS,IROUTE))) 670,660,660               02640700
                C*****SWITCH TO MAINTAINING CONSTANT SPEED MODE - MODE=1          02640800
ISN 0352          660 MODEV(NUMV)=1                                              02640900
ISN 0353              UV(NUMV)=ABS(UMXTS(JTS,IROUTE))                            02641000
ISN 0354              GO TO 820                                                  02641100
                C*****SWITCH TO ACCELERATING MODE - MODE=2                        02641200
ISN 0355          670 MODEV(NUMV)=2                                              02641300
ISN 0356              GO TO 820                                                  02641400
                C                                                                02641500
                C*****MAINTAINING CONSTANT MINIMUM SPEED IN A TRACK SECTION WHERE 02641600
                C*****COASTING IS PERMITTED MODE - MODE=6                        02641700
                C                                                                02641800
                C*****FIND TRAIN SPEED                                           02641900
ISN 0357          680 UNEW=UV(NUMV)                                              02642000
                C*****FIND TRACTIVE EFFORT REQUIRED                              02642100
ISN 0358              TEREQ=RSISTV(NUMV)/MOTORV(ITYP)                            02642200
                C*****IF TRACTIVE EFFORT REQUIRED IS NEGATIVE THEN SWITCH TO COASTING 02642300
                C*****MODE - MODE=5                                              02642400
ISN 0359              IF (TEREQ) 690,690,700                                     02642500
ISN 0360          690 MODEV(NUMV)=5                                              02642600
ISN 0361              TEV(NUMV)=0.0                                              02642700
ISN 0362              GO TO 560                                                  02642800
                C*****FIND TRACTIVE EFFORT AVAILABLE                             02642900
ISN 0363          700 TE=TORQUE(UNEW,ITYP)                                       02643000
                C*****CHECK IF AVAILABLE T.E. IS GREATER THAN REQUIRED T.E.      02643100
ISN 0364              IF (TE-TEREQ) 750,710,710                                  02643200
                C*****COMPUTE AVAILABLE TRACTIVE EFFORT, LINE CURRENT AND MOTOR CURRENT 02643300
ISN 0365          710 TEV(NUMV)=TEREQ                                            02643400
ISN 0366              AMPV(NUMV)=AMPERE(TEREQ,ITYP)                              02643500
ISN 0367              AMPLV(NUMV)=AMPERL(UNEW,TEREQ,ITYP)                        02643600
                C*****COMPUTE NEW TRAIN LOCATION                                 02643700
ISN 0368              XV(NUMV)=XV(NUMV)+UNEW*DELT                                02643800
                C*****CHECK IF TRAIN HAS LEFT COASTING SECTION                   02643900
ISN 0369              IF (UMXTS(JTS,IROUTE)) 820,720,720                         02644000
ISN 0370          720 IF (UNEW-ABS(UMXTS(JTS,IROUTE))) 730,740,740               02644100
                C*****SWITCH TO ACCELERATION MODE - MODE=2                        02644200
ISN 0371          730 MODEV(NUMV)=2                                              02644300
ISN 0372              GO TO 820                                                  02644400
                C*****SWITCH TO MAINTAINING CONSTANT SPEED MODE - MODE=1          02644500
ISN 0373          740 MODEV(NUMV)=1                                              02644600
ISN 0374              UV(NUMV)=ABS(UMXTS(JTS,IROUTE))                            02644700
ISN 0375              GO TO 820                                                  02644800
                C*****SWITCH TO ATTEMPTING TO MAINTAIN MINIMUM SPEED MODE - MODE=7 02644900
ISN 0376          750 MODEV(NUMV)=7                                              02645000
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                C                                                                02645100
                C*****ATTEMPTING TO MAINTAIN CONSTANT MINIMUM SPEED IN A TRACK SECTION  02645200
                C*****WHERE COASTING IS PERMITTED - MODE=7                       02645300
                C                                                                02645400
                C*****COMPUTE AVAILABLE TRACTIVE EFFORT, LINE CURRENT AND MOTOR CURRENT 02645500
ISN 0377          760 TE=TORQUE(UV(NUMV),ITYP)                                   02645600
ISN 0378              TEV(NUMV)=TE                                               02645700
ISN 0379              AMPV(NUMV)=AMPERE(TE,ITYP)                                 02645800
ISN 0380              AMPLV(NUMV)=AMPERL(UV(NUMV),TE,ITYP)                       02645900
                C*****FIND ACCELERATION TRAIN IS CAPABLE OF                      02646000
ISN 0381              DUDTV(NUMV)=(TE*MOTCRV(ITYP)-RSISTV(NUMV))/(WV(ITYP)*RRACC(ITYP)+W02646100
                     1PATV(NUMV)/GRACC)                                          02646200
                C*****FIND NEW TRAIN SPEED                                       02646300
ISN 0382              UNEW=UV(NUMV)+DUDTV(NUMV)*DELT                             02646400
                C*****IF TRAIN SPEED IS GREATER THAN UMIN, SET SPEED TO UMIN AND 02646500
                C*****SWITCH BACK TO CONSTANT MINIMUM SPEED MODE                 02646600
ISN 0383              IF (UNEW-UMINRT(IROUTE)) 780,770,770                       02646700
ISN 0384          770 UNEW=UMINRT(IROUTE)                                        02646800
ISN 0385              MODEV(NUMV)=6                                              02646900
ISN 0386              DUDTV(NUMV)=0.0                                            02647000
                C*****COMPUTE NEW TRAIN LOCATION AND STORE NEW TRAIN SPEED       02647100
ISN 0387          780 XV(NUMV)=XV(NUMV)+0.5*(UV(NUMV)+UNEW)                      02647200
ISN 0388              UV(NUMV)=UNEW                                              02647300
                C*****CHECK IF TRAIN HAS LEFT COASTING TRACK SECTION             02647400
ISN 0389              IF (UMXTS(JTS,IROUTE)) 820,790,790                         02647500
                C*****TRAIN CAN NO LONGER COAST - SWITCH TO ANOTHER MODE         02647600
ISN 0390          790 IF (UNEW-ABS(UMXTS(JTS,IROUTE))) 800,810,810               02647700
                C*****SWITCH TO ACCELERATION MODE - MODE=2                       02647800
ISN 0391          800 MODEV(NUMV)=2                                              02647900
ISN 0392              GO TO 820                                                  02648000
                C*****SWITCH TO MAINTAINING CONSTANT SPEED MODE - MODE=1         02648100
ISN 0393          810 MODEV(NUMV)=1                                              02648200
ISN 0394              UV(NUMV)=ABS(UMXTS(JTS,IROUTE))                            02648300
                C                                                                02648400
                C*****CONVERGENCE POINT FOR MODES 0,1,2,3,4,5,6,7     ( TPOPT=1 ) 02648500
                C                                                                02648600
ISN 0395          820 RSISTV(NUMV)=DRAGV(NUMV)                                   02648700
                C*****FIND TRAIN POSITION, AND ITS GRADE AND CURVE RESISTANCE    02648800
ISN 0396              CALL LOCATE (NUMV,ITYP,IROUTE,RG,RC)                       02648900
                C*****FIND TRAIN TOTAL WEIGHT, GRADE AND CURVE RESISTANCES AND SUM OF 02649000
                C*****GRADE, CURVE, AND ROLLING RESISTANCES                      02649100
ISN 0397              WTRN=WV(ITYP)+WPATV(NUMV)                                  02649200
ISN 0398              RG=RG*WTRN                                                 02649300
ISN 0399              RC=RC*WTRN/TONLB                                           02649400
                C*****COMPUTE MECHANICAL ROLLING RESISTANCE OF TRAIN             02649500
ISN 0400              RM=CORMV(ITYP,2)+(CORMV(ITYP,1)+CORMV(ITYP,3)*UV(NUMV))*WTRN 02649600
                C*****COMPUTE HEAT REJECTION CAUSED BY MECHANICAL RESISTANCE     02649700
ISN 0401              RMHTV(NUMV)=(RM+RC)*UV(NUMV)*FLOBTU                        02649800
                C*****IF AERO IS NOT RUNNING COMPUTE AIR DRAG ON VEHICLE         02649900
ISN 0402              IF (JRATAE) 850,850,830                                    02650000
                C*****IF IT IS NOT TIME FOR AERO STEP REPLACE AIR DRAG           02650100
ISN 0403          830 IF (AETIME-NTIME) 860,860,840                              02650200
ISN 0404          840 DRAGV(NUMV)=RSISTV(NUMV)                                   02650300
ISN 0405              GO TO 860                                                  02650400
                C*****COMPUTE AIR DRAG ON TRAIN RUNNING IN OPEN AIR              02650500
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ISN 0406        850 DRAGV(NUMV)=(AV(ITYP)*(CDFVOV(ITYP)+CDBVOV(ITYP))+LAMDAV(ITYP)*LV(02650600
                   1ITYP)/4.0)*0.5*PHOMAS*LV(NUMV)**2                                  02650700
ISN 0407            RSISTV(NUMV)=DRAGV(NUMV)                                           02650800
ISN 0408        860 RSISTV(NUMV)=RSISTV(NUMV)+RG+RC+RM                                 02650900
                C*****CHECK IF TIME FOR COMPLETE TRAIN BRAKING CHECK                   02651000
ISN 0409            IF (NTIME-TRTIME) 1070,870,870                                     02651100
                C*****BYPASS COMPLETE TRAIN BRAKING CHECK IF MODES 3 OR 4              02651200
ISN 0410        870 NUMY1=MODEV(NUMV)+1                                                02651300
ISN 0411            GO TO (1070,880,880,1070,1070,880,880,880), NUMY1                  02651400
                C                                                                      02651500
                C*****COMPLETE TRAIN BRAKING CHECK - INITIATES BRAKING                 02651600
                C                                                                      02651700
                C*****CHECK SPEED RESTICTIONS IN FRONT OF TRAIN, CONTINUING UNTIL A     02651800
                C*****STATION (0 MPH) OR THE END OF THE ROUTE IS FOUND                 02651900
ISN 0412        880 JTS=NTSV(NUMV)+1                                                   02652000
ISN 0413            NTS=NTSPT(IROUTE)                                                  02652100
                C*****CHECK FOR END OF TRACK SECTIONS                                  02652200
ISN 0414        890 IF (NTS-JTS) 1070,900,900                                          02652300
                C*****COMPUTE ANTICIPATED SPEED AT NEXT TIME OF COMPLETE TRAIN         02652400
                C*****BRAKING CHECK. THIS POINT IS WORKED WITH TO CAUSE THE TRAIN TO   02652500
                C*****BRAKE 'EARLY' RATHER THAN 'LATE'                                 02652600
ISN 0415        900 UNEXT=LV(NUMV)+DUDTV(NUMV)*DELTR                                   02652700
                C*****COMPUTE SPEED REDUCTION REQUIRED                                 02652800
ISN 0416            SPDIF= UV(NUMV) - ABS(UMXTS(JTS,IROUTE))                           02652900 ← C
ISN 0417            IF (SPDIF) 1050,1050,910                                           02653000
                C*****SPEED RESTRICTION IS LOWER THAN CURRENT TRAIN SPEED, THEREFORE   02653100
                C*****COMPUTE BRAKING TIME AND DISTANCE. BEGIN BY DETERMINING IF IN    02653200
                C*****CONSTANT OR VARYING DECELERATION RATE RANGE                      02653300
ISN 0418        910 IF (UNEXT-DECV1V(ITYP)) 920,920,930                                02653400
                C*****CONSTANT DECELERATION RATE                                       02653500
ISN 0419        920 STTIM= (UNEXT-ABS(UMXTS(JTS,IROUTE))) / DECV(ITYP)                 02653600 ← C
ISN 0420            STDIS=UNEXT*STTIM-0.5*DECV(ITYP)*STTIM**2                          02653700
ISN 0421            GO TO 990                                                          02653800
                C*****VARYING DECELERATION RATE RANGE, COMPUTE LOWEST SPEED THAT WILL   02653900
                C*****OCCUR IN IT                                                      02654000
ISN 0422        930 IF (ABS(UMXTS(JTS,IROUTE))-DECV1V(ITYP)) 950,950,940               02654100
ISN 0423        940 V1T=ABS(UMXTS(JTS,IROUTE))                                         02654200
ISN 0424            GO TO 960                                                          02654300
ISN 0425        950 V1T=DECV1V(ITYP)                                                   02654400
                C*****COMPUTE BRAKING TIME AND DISTANCE FOR VARYING PORTION OF CURVE   02654500
ISN 0426        960 T1=-ALOG((DECAV(ITYP)*V1T+DECBV(ITYP))/(DECAV(ITYP)*UNEXT+DECBV(IT02654600
                   1YP)))/DECAV(ITYP)                                                  02654700
ISN 0427            S1=(DECAV(ITYP)*UNEXT+DECBV(ITYP))*(1.0-EXP(-DECAV(ITYP)*T1))/DECA02654800
                   1V(ITYP)**2-DECBV(ITYP)*T1/DECAV(ITYP)                              02654900
ISN 0428            IF (ABS(UMXTS(JTS,IROUTE))-DECV1V(ITYP)) 980,980,970               02655000
                C*****CONSTANT DECELERATION PORTION OF CURVE IS NOT BEING USED         02655100
                C*****BECAUSE SPEED RESTRICTION 'UMXTS' IS ABOVE 'DECV1V'              02655200
ISN 0429        970 STDIS=S1                                                           02655300
ISN 0430            GO TO 990                                                          02655400
                C*****COMPUTE BRAKING TIME AND DISTANCE ON CONSTANT DECELERATION       02655500
                C*****PORTION OF CURVE                                                 02655600
ISN 0431        980 T2=(DECV1V(ITYP)-ABS(UMXTS(JTS,IROUTE)))/DECV(ITYP)                02655700
ISN 0432            S2=DECV1V(ITYP)*T2-0.5*DECV(ITYP)*T2**2                            02655800
ISN 0433            STDIS=S1+S2                                                        02655900
                C*****CHECK IF NECESSARY TO BRAKE FOR THIS SPEED RESTRICTION BEFORE     02656000
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                C*****NEXT COMPLETE TRAIN EVALUATION                                    02656100
ISN 0434          990 IF (STOTS+UV(NUMV)*DELTR+0.5*DUDTV(NUMV)*DELTR**2-(FSTS(JTS-1,IROU02656200
                     1TE)-XV(NUMV))) 1050,1050,1000                                     02656300
                C*****IT IS NECESSARY TO BRAKE NOW - SWITCH TO MODE 3 OR 4              02656400
                C*****SET TRACK SECTION TRAIN IS BRAKING FOR                            02656500
ISN 0435         1000 NTSV2(NUMV)=JTS                                                   02656600
                C*****TURN TRAIN POWER OFF                                              02656700
ISN 0436              TEV(NUMV)=0.0                                                     02656800
ISN 0437              AMPV(NUMV)=0.0                                                    02656900
ISN 0438              AMPLV(NUMV)=0.0                                                   02657000
                C*****COMPUTE DECELERATION RATE                                         02657100
ISN 0439              IF (UV(NUMV)-DECV1V(ITYP)) 1020,1020,1010                         02657200
                C*****ABOVE SPEED V1 - VARYING DECELERATION RATE                        02657300
ISN 0440         1010 MODEV(NUMV)=3                                                     02657400
ISN 0441              DUDTV(NUMV)=-DECBV(ITYP)-DECAV(ITYP)*UV(NUMV)                     02657500
ISN 0442              GO TO 1070                                                        02657600
                C*****BELOW SPEED V1 - CONSTANT DECELERATION RATE                       02657700
ISN 0443         1020 MODEV(NUMV)=4                                                     02657800
ISN 0444              IF (ABS(UMXTS(JTS,IROUTE))-0.1) 1030,1040,1040                    02657900
                C*****TRAIN IS STOPPING FOR A STATION                                   02658000
                C*****COMPUTE STOPPING TIME AND DECELERATION RATE                       02658100
ISN 0445         1030 STTIM=(FSTS(JTS-1,IROUTE)-XV(NUMV))*2.0/UV(NUMV)                  02658200
ISN 0446              IF( STTIM ) 1047,1047,1035                                        02658210 ← I
ISN 0447         1035 DUDTV(NUMV)=-UV(NUMV)/STTIM                                       02658300 ← C
ISN 0448              GO TO 1070                                                        02658400
                C*****TRAIN IS SLOWING FOR A SPEED RESTRICTION                          02658500
                C*****ADJUST STOPPING TIME TO AN INTEGER DELTA T                        02658600
ISN 0449         1040 STTIM=(UV(NUMV)-ABS(UMXTS(JTS,IROUTE)))/DECV(ITYP)                02658700
ISN 0450              INT=IFIX(STTIM/DELT+0.9999)                                       02658800
ISN 0451              STTIM=FLOAT(INT)*DELT                                             02658900
ISN 0452              IF( STTIM ) 1047,1047,1045                                        02658910 ← I
ISN 0453         1045 DUDTV(NUMV)=(ABS(UMXTS(JTS,IROUTE))-UV(NUMV))/STTIM               02659000 ← C
ISN 0454              GO TO 1070                                                        02659100
                C*****USE MAXIMUM DECELERATION RATE                                     02659110
ISN 0455         1047 DUDTV(NUMV) = DECV(ITYP)                                          02659120 ← I
ISN 0456              GO TO 1070                                                        02659130
                C*****SPEED RESTRICTION IS HIGHER THAN CURRENT SPEED OR THERE IS        02659200
                C*****SUFFICIENT BRAKING DISTANCE                                       02659300
                C*****CHECK FOR A STATION (MAXIMUM SPEED OF ZERO)                       02659400
ISN 0457         1050 IF (ABS(UMXTS(JTS,IROUTE))-0.1) 1070,1070,1060                    02659500
ISN 0458         1060 JTS=JTS+1                                                         02659600
ISN 0459              GO TO 890                                                         02659700
ISN 0460         1070 CONTINUE                                                          02659800
ISN 0461              CALL HEAT (NUMV,ITYP,TEV(NUMV),AMPV(NUMV),AMPLV(NUMV))            02659900
ISN 0462         1080 CONTINUE                                                          02660000
                C*****END OF IMPLICIT TRAIN PERFORMANCE                                 02660100
ISN 0463              RETURN                                                            02660200
                C                                                                       02660300
                C                                                                       02660400
                C*****EXPLICIT TRAIN PERFORMANCE                    TPOPT = 2 + 3       02660500
                C                                                                       02660600
                C                                                                       02660700
ISN 0464         1090 DO 1260 ITRAN=1,NTRAN                                             02660800
                C*****FIND TRAIN NUMBER, TYPE, AND ROUTE                                02660900
ISN 0465              NUMV=INDEX(ITRAN)                                                 02661000
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ISN 0466          ITYP=ITYPV(NUMV)                                          02661100
ISN 0467          IROUTE=IRCTEV(NUMV)                                       02661200
            C*****COMPUTE THE TRAIN POSITION, SPEED, ACCELERATION AND POWER  02661300
            C*****REJECTIONS (TPOPT=3 ONLY) BY INTERPOLATION OF THE USER-SUPPLIED 02661400
            C*****SPEED AND POWER REJECTIONS VS. TIME                        02661500
ISN 0468          CALL RATES (NUMV,IRCUTE,QACC,QDEC)                        02661600
ISN 0469          RSISTV(NUMV)=DRAGV(NUMV)                                  02661700
            C*****FIND TRAIN POSITION, AND ITS GRADE AND CURVE RESISTANCE    02661800
ISN 0470          CALL LOCATE (NUMV,ITYP,IROUTE,RG,RC)                      02661900
ISN 0471          GO TO (1280,1100,1200), TPOPT                             02662000
            C                                                               02662100
            C*****IMPLICIT HEAT REJECTION                    TPOPT = 2      02662200
            C                                                               02662300
            C*****COMPUTE HEAT REJECTION FROM MOTOR CURVES                  02662400
            C*****COMPUTE MECHANICAL ROLLING RESISTANCE OF TRAIN            02662500
ISN 0472   1100 RM=CORMV(ITYP,2)+(CCRMV(ITYP,1)+CORMV(ITYP,3)*UV(NUMV))*(WV(ITYP)+02662600
           1WPATV(NUMV))                                                    02662700
ISN 0473          RMHTV(NUMV)=(RM+RC)*UV(NUMV)*FLBBTU                       02662800
            C*****IF AERO IS NOT RUNNING COMPUTE AIR DRAG ON VEHICLE        02662900
ISN 0474          IF (JRATAE) 1130,1130,1110                                02663000
            C*****IF IS NOT TIME FOR AERO STEP REPLACE AIR DRAG             02663100
ISN 0475   1110 IF (AETIME-NTIME) 1140,1140,1120                            02663200
ISN 0476   1120 DRAGV(NUMV)=RSISTV(NUMV)                                    02663300
ISN 0477          GO TO 1140                                                02663400
ISN 0478   1130 DRAGV(NUMV)=(AV(ITYP)*(CDFVOV(ITYP)+CDBVOV(ITYP))+LAMDAV(ITYP)*LV(02663500
           1ITYP)/4.0)*0.5*RHOMAS*LV(NUMV)**2                               02663600
ISN 0479          RSISTV(NUMV)=DRAGV(NUMV)                                  02663700
ISN 0480   1140 RSISTV(NUMV)=RSISTV(NUMV)+RG+RC+RM                          02663800
            C*****COMPUTE TRACTIVE EFFORT REQUIRED TO PRODUCE DESIRED ACCELERATION 02663900
ISN 0481          TEV(NUMV)=(DUDTV(NUMV)*(WV(ITYP)*RRACC(ITYP)+WPATV(NUMV)/GRACC)+RS02664000
           1ISTV(NUMV))/MUTORV(ITYP)                                        02664100
ISN 0482          IF (UV(NUMV)-0.01) 1170,1150,1150                         02664200
ISN 0483   1150 IF (TEV(NUMV)) 1180,1180,1160                               02664300
ISN 0484   1160 AMPV(NUMV)=AMPERE(TEV(NUMV),ITYP)                           02664400
ISN 0485          AMPLV(NUMV)=AMPERL(UV(NUMV),TEV(NUMV),ITYP)               02664500
ISN 0486          GO TO 1190                                                02664600
ISN 0487   1170 TEV(NUMV)=0.0                                               02664700
ISN 0488   1180 AMPV(NUMV)=0.0                                              02664800
ISN 0489          AMPLV(NUMV)=0.0                                           02664900
ISN 0490   1190 CALL HEAT (NUMV,ITYP,TEV(NUMV),AMPV(NUMV),AMPLV(NUMV))      02665000
ISN 0491          GO TO 1250                                                02665100
            C                                                               02665200
            C*****EXPLICIT HEAT REJECTION                    TPOPT = 3      02665300
            C                                                               02665400
            C*****COMPUTE HEAT REJECTIONS IN BTU FROM POWER REJECTIONS IN KW 02665500
ISN 0492   1200 QACCV(NUMV)=QACC*WTBTUS*1000.0                              02665600
ISN 0493          QDECV(NUMV)=QDEC*WTBTUS*1000.0                            02665700
            C*****COMPUTE HEAT CREATED BY MECHANICAL ROLLING FRICTION       02665800
ISN 0494          RM=CORMV(ITYP,2)+(CORMV(ITYP,1)+CORMV(ITYP,3)*UV(NUMV))*(WV(ITYP)+02665900
           1WPATV(NUMV))                                                    02666000
ISN 0495          RMHTV(NUMV)=(RM+RC)*UV(NUMV)*FLBBTU                       02666100
            C*****IF AERO IS NOT RUNNING COMPUTE AIR DRAG ON VEHICLE        02666200
ISN 0496          IF (JRATAE) 1230,1230,1210                                02666300
            C*****IF IT IS NOT TIME FOR AERO STEP REPLACE AIR DRAG          02666400
ISN 0497   1210 IF (AETIME-NTIME) 1240,1240,1220                            02666500
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ISN 0498      1220 DRAGV(NUMV)=RSISTV(NUMV)                                    02666600
ISN 0499           GO TO 1240                                                  02666700
ISN 0500      1230 DRAGV(NUMV)=(AV(ITYP)*(CDFVOV(ITYP)+CDBVOV(ITYP))+LAMDAV(ITYP)*LV(02666800
                  1ITYP)/4.0)*0.5*RHOMAS*LV(NUMV)**2                           02666900
ISN 0501           RSISTV(NUMV)=DRAGV(NUMV)                                    02667000
ISN 0502      1240 RSISTV(NUMV)=RSISTV(NUMV)+RG+RC+RM                          02667100
             C*****INCREMENT TIME SINCE TRAIN DISPATCH                         02667200
ISN 0503      1250 TLPSV(NUMV)=TLPSV(NUMV)+NDELT                               02667300
ISN 0504      1260 CONTINUE                                                    02667400
             C*****END OF EXPLICIT TRAIN PERFORMANCE                           02667500
ISN 0505      1270 RETURN                                                      02667600
             C                                                                 02667700
             C*****IMPOSSIBLE SITUATION                                        02667800
             C                                                                 02667900
ISN 0506      1280 WRITE (OUT,1290)                                            02668000
ISN 0507      1290 FORMAT (1H1,'IMPOSSIBLE SITUATION - SUBROUTINE TRAIN')      02668100
ISN 0508           STOP                                                        02668200
ISN 0509           END                                                         02668300
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July 23, 1976

SUBWAY ENVIRONMENT SIMULATION (SES) COMPUTER PROGRAM

REVISION NO. 4 TO VERSION 2

Problem

An unitialized variable has been found which may sometimes result in UNDERFLOW or OVERFLOW messages. Results are not affected. The program version number is also updated to 2.04.

Symptoms

This problem is intermittent, and may result in floating point UNDERFLOW or OVERFLOW messages produced in subroutine MAXMIN.

Correction

See attached corrected listing of subroutine VSINS. New lines are indicated by the letter "I." Also see attached corrected listing of subroutine INPUT. Changed lines are indicated by the letter "C."

Effect on Previous Results

The UNDERFLOW or OVERFLOW messages may have prevented program operation. However, the results are not affected.

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          COMPILER OPTIONS - NAME=  MAIN,OPT=02,LINECNT=57,SIZE=0000K,
                             SOURCE,EBCDIC,NOLIST,NODECK,LOAD,MAP,NOEDIT,ID,NOXREF
 ISN 0002            SUBROUTINE  VSINS( IVS )                                    02766900
                 C                                                               02767000
                 C     VENTILATION SHAFT INPUT SUBROUTINE                        02767100
                 C                                                               02767200
                 C    INCLUDE  DSHARE                                            02767300
                 C                                                               02767400
                 C ************************ INTEGER VARIABLES ************************ C02767500
                 C                                                               02767600
                 C  GENERAL VARIABLES                                            02767700
 ISN 0003            INTEGER   AETIME, BLANK, BLPREQ, DATE(8), DEATH, DESPER, FSCFT   02767800
 ISN 0004            INTEGER   HCOPT, HSOPT, HUMOPT, OUT, PRTIME, SLASH, SUPOPT      02767900
 ISN 0005            INTEGER   SYSTEM(18), THOPT, THTIME, TNLSS, TNSS, TPOPT, TRTIME 02768000
                 C  SECTION VARIABLES  (LMSECT)                                  02768100
 ISN 0006            INTEGER   NTOPS(140)                                        02768200
 ISN 0007            INTEGER   TABL9(140), TABL10(140), TABL11(140), TABL12(140)  02768300
 ISN 0008            INTEGER   TABL13(140), TABL20(140), TABL21(140)              02768400
                 C    SECTION (LMSECT), SECTION+ONE  (LMSECT+1) ,  SECTION+TWO (LMSECT+2)02768500
 ISN 0009            INTEGER   ND(140), NDS(141), NDSS(142)                      02768600
                 C    SECTION * ESTIMATED AVERAGE OF 3 LOOPS THROUGH SECTION ( LMLPK )  02768700
 ISN 0010            INTEGER   LKAN(420)                                         02768800
                 C    SECTION EXTERNAL IDENTIFICATION NUMBERS (LMSCTX)            02768900
 ISN 0011            INTEGER   TABL14(400)                                       02769000
                 C  NODE VARIABLES  (LMNODE)                                     02769100
 ISN 0012            INTEGER   TABL1(132), TABL15(130), TABL16(130), TABL22(130)  02769200
 ISN 0013            INTEGER   TABL23(132), TABL45(130), TYPIND(130)             02769300
                 C  AERODYNAMIC NODE VARIABLES (LMTBL2)                          02769400
 ISN 0014            INTEGER   TABL2(1500)                                       02769500
                 C    NODES BY NUMBER OF SECTIONS CONNECTED TO NODE (LMNODE X LMSCND)  02769600
 ISN 0015            INTEGER   TABL17(130,5), TABL18(130,5)                      02769700
                 C    NODE EXTERNAL IDENTIFICATION NUMBERS (LMSCTX)               02769800
 ISN 0016            INTEGER   TABL19(400)                                       02769900
                 C  LOOP VARIABLES  (LMNLOP)                                     02770000
                 C  LINE SEGMENT VARIABLES  (LMLSEG)                             02770100
 ISN 0017            INTEGER   NTRNLS(90), NUMLS(90), TABL3(90), TABL4(90), TABL8(90)  02770200
 ISN 0018            INTEGER   TYPLS(90)                                         02770300
                 C    LINE SEGMENT BY NUMBER OF TRAINS IN SEGMENT  (LMLSEG X LMTRSG)  02770400
 ISN 0019            INTEGER   TRNNLS(90,8)                                      02770500
                 C  VENTILATION SHAFT SEGMENT VARIABLES    ( LMVSEG )            02770600
 ISN 0020            INTEGER   FTCFVS(60), FTONVS(60), NUMVS(60)                 02770700
 ISN 0021            INTEGER   TABL6(60), TYPVS(60), EXVOVS(60), FTYPVS(60), TABL5(60) 02770800
                 C  SUBSEGMENT VARIABLES  (LMSS)                                 02770900
 ISN 0022            INTEGER   TABL7(300), TABL44(300)                           02771000
                 C  LINE SUBSEGMENT VARIABLES   ( LMLSS X TABLE SIZE )           02771100
 ISN 0023            INTEGER   EXDTDR(250,6)                                     02771200
                 C    LINE SUBSEGMENT BY TRAIN ROUTE ( LMLSS X LMTRRT )          02771300
 ISN 0024            INTEGER   ITNLSS(250,6)                                     02771400
                 C  HEATING OR COOLING ZONE CLUSTER VARIABLES  (LMCLST)          02771500
 ISN 0025            INTEGER   TYPCL(30)                                         02771600
                 C  SUBWAY VEHICLE TYPE VARIABLES  (LMTRTP)                      02771700
 ISN 0026            INTEGER   NCARV(3), NPCARV(3)                               02771800
                 C  UNDERPLATFORM EXHAUST VARIABLES                              02771900
 ISN 0027            INTEGER   OPTUX                                             02772000
                 C  ROUTE VARIABLES  (LMTRRT)                                    02772100
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ISN 0028          INTEGER   COPTRT(6), NTSRT(6)                                02772200
            C    DISPATCHER VARIABLES (LMTRPT) AND (LMTRGP X LMTRRT)           02772300
ISN 0029          INTEGER   GRTYPV(15,6), JGROUP(6), NGRV(6), NMTRGR(6)        02772400
ISN 0030          INTEGER   MTRGR(15,6)                                        02772500
ISN 0031          INTEGER   GRHDNV(15,6)                                       02772600
            C    TRACK SECTION VARIABLES  (LMTSRT X LMTRRT)                    02772700
ISN 0032          INTEGER   DWLTS(260,6)                                       02772800
ISN 0033          INTEGER   NPETTS(260,6), NSEGTS(260,6)                       02772900
            C    EXPLICIT TRAIN PERFORMANCE VARIABLES  (LMEXPD X LMTRRT)       02773000
ISN 0034          INTEGER   NEXPDP(6)                                          02773100
ISN 0035          INTEGER   TIMEV(201,6)                                       02773200
            C  OPERATIONAL TRAIN VARIABLES  (LMTRAN)                           02773300
ISN 0036          INTEGER   DPV(30), INDEX(30), IROTFV(30), ITYPV(30), MODEV(30)  02773400
ISN 0037          INTEGER   NTSV(30), NTSV2(30), TNUMV(30)                     02773500
ISN 0038          INTEGER   TLPSV(30), TSTRTV(30)                              02773600
            C  FAN TYPE VARIABLES  (LMFNTP)                                    02773700
            C  UNSTEADY HEAT LOAD VARIABLES  ( LMUL )                          02773800
ISN 0039          INTEGER   LSSUL(10)                                          02773900
            C  PRINT GROUP VARIABLES  ( LMPRGP )                               02774000
ISN 0040          INTEGER   GINTPR(15), GRABBP(15), GRSUM(15), NPRGR(15)       02774100
            C                                                                  02774200
            C ************************** REAL VARIABLES ************************** C02774300
            C                                                                  02774400
            C  GENERAL VARIABLES                                               02774500
ISN 0041          REAL      NUAIR, MPHFPS                                    02774600
            C  SECTION VARIABLES                                               02774700
            C  NODE VARIABLES                                                  02774800
            C  LOOP VARIABLES                                                  02774900
            C  LINE SEGMENT VARIABLES                                          02775000
ISN 0042          REAL      LLS(90), LLSS(90)                                02775100
            C  VENTILATION SHAFT SEGMENT VARIABLES                             02775200
ISN 0043          REAL      LVS(60), LVSS(60)                                02775300
            C  SUBSEGMENT VARIABLES                                            02775400
ISN 0044          REAL      LHLTSS(300), LSUMSS(300)                         02775500
            C  LINE SUBSEGMENT VARIABLES                                       02775600
ISN 0045          REAL      LACLSS(250), LHLSS(250)                          02775700
            C  ZONE VARIABLES                                                  02775800
            C  SUBWAY VEHICLE TYPE VARIABLES                                   02775900
ISN 0046          REAL      LAMDAV(3), LHREV(3), LV(3), MCPCAV(3), MCPGDV(3) 02776000
ISN 0047          REAL      MOTORV(3)                                        02776100
            C  ROUTE VARIABLES                                                 02776200
            C    DISPATCHER VARIABLES                                          02776300
            C    TRACK SECTION VARIABLES                                       02776400
            C    EXPLICIT TRAIN PERFORMANCE VARIABLES                          02776500
            C  OPERATIONAL TRAIN VARIABLES                                     02776600
            C  FAN TYPE VARIABLES                                              02776700
            C  PRINT GROUP VARIABLES                                           02776800
            C                                                                  02776900
            C ***************************** COMMON ****************************** C02777000
            C                                                                  02777100
            C GENERAL VARIABLES                                                02777200
ISN 0048          COMMON    AETIME, ANNAMP, BLANK, BLPREC, DATE, DEATH         02777300
ISN 0049          COMMON    DELAE, DELP, DELT, DELTH, DELTR, DEL2TH, DESPER, ESCFT  02777400
ISN 0050          COMMON    HCOPT, HMAMBE, HMAMBM, HOUR, HSOPT, HUMAMB, HUMOPT  02777500
ISN 0051          COMMON    IEQUAT, IN, INODE, IPRGRP, ISITU, JRATAE, JRATTH, JRATTR 02777600
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ISN 0052          COMMON   KAERO, KASTEP, KBND1, KBND2, KBND3, KPRNTH, KTSTEP, LIFE 02777700
ISN 0053          COMMON   LINES, MAXTIM, MONTH, MXMNPT, NBR, NBRJCT, NCLUST, NDELT 02777800
ISN 0054          COMMON   NDTYPA, NEW, NENTYP, NLOOP, NLS, NLSCPI, NLSEC, NNODE    02777900
ISN 0055          COMMON   NOSUMY, NOSYS, NCTRAN, NPGRP, NPORTL, NSEC, NSIMFR       02778000
ISN 0056          COMMON   NTIME, NTNODE, NTRAN, NTRRTE, NTRTYP, NUMUL, NVSEC       02778100
ISN 0057          COMMON   NZONE, OUT, PAMB, PRTIME, SLASH                          02778200
ISN 0058          COMMON   SUMTST, SUPCPT, SYSTEM, TAMBA, TAMBM, TDRAMB             02778300
ISN 0059          COMMON   THOPT, THTIME, TNLSS, TNSS, TPOPT, TRTIME, TWBAMB, TWAMBE02778400
ISN 0060          COMMON   TWAMBM, WNTSUM                                           02778500
            C  ARRAY SIZE LIMITS                                                    02778600
ISN 0061          COMMON   LMBLP,LMCLST,LMCCND,LMEQRM, LMEXPD, LMENTP, LMLPK, LMLPLK02778700
ISN 0062          COMMON   LMLSEG, LMLSS, LMNLOP, LMNODE, LMNCDX, LMPRGP, LMSCND    02778800
ISN 0063          COMMON   LMSCTX, LMSECT, LMSS, LMSSTN, LMTBL2, LMTHND, LMTRAN     02778900
ISN 0064          COMMON   LMTRGP, LMTRRT, LMTRSG, LMTRTP, LMTSRT, LMUL, LMVSEG     02779000
            C  PHYSICAL CONSTANTS                                                   02779100
ISN 0065          COMMON   ABTEMP, BTUFLB, CP, FLBBTU, FLBHP, FPSMPH, FTIN, GRACC   02779200
ISN 0066          COMMON   HVH2O, MPHFPS, NUAIR, PI, PR, RDRYAR, RHOCP, RHOMAS      02779300
ISN 0067          COMMON   RHOWHT, SAINHG, SAPSI, STEFAN, THCON, TONLB, VISAIR      02779400
ISN 0068          COMMON   WGCONS, WTBTUS                                           02779500
            C  SECTION VARIABLES  ( LMSECT )                                        02779600
ISN 0069          COMMON   AHIGHS(140), ALOWS(140), BCS(140), BS(140), CEPS(140)    02779700
ISN 0070          COMMON   CENS(140), DODTS(140), MNCS(140), MXQS(140), NTQPS       02779800
ISN 0071          COMMON   OMEGS(140), QS(140), QSAVES(140), QSMX(140), QSMN(140)   02779900
ISN 0072          COMMON   SUMQNS(140), SUMQPS(140), TABL9, TABL10, TABL11, TABL12  02780000
ISN 0073          COMMON   TABL13, TABL20, TABL21, VHIGHS(140), VLOWS(140)          02780100
            C    SECTION + TWO  (LMSECT+2)                                          02780200
ISN 0074          COMMON   NDSS                                                     02780300
            C    SECTION * ESTIMATED AVERAGE OF 3 LOOPS THROUGH SECTION ( LMLPLK )  02780400
ISN 0075          COMMON   LKAN                                                     02780500
            C    SECTION EXTERNAL IDENTIFICATION NUMBERS                            02780600
ISN 0076          COMMON   TABL14                                                   02780700
            C  NODE VARIABLES  ( LMNODE )                                           02780800
ISN 0077          COMMON   TABL1, TABL15, TABL16, TABL17, TABL18, TABL22, TABL23    02780900
ISN 0078          COMMON   TABL45, TYPIND                                           02781000
            C    NODE EXTERNAL IDENTIFICATION NUMBERS                               02781100
ISN 0079          COMMON   TABL19                                                   02781200
            C  AERODYNAMIC NODE VARIABLES  (LMTBL2)                                 02781300
ISN 0080          COMMON   TABL2                                                    02781400
            C  AERODYNAMIC JUNCTION COEFFICIENTS ( LMCOND )                         02781500
ISN 0081          COMMON   COAEND(950)                                              02781600
            C  THERMODYNAMIC NODE VARIABLES  ( LMTHND )                             02781700
ISN 0082          COMMON   HAVGTN(140), HUMTN(140), TAVGTN(140), TDBTN(140)         02781800
            C    THERMODYNAMIC NODES BY NUMBER OF SECTIONS CONNECTED TO A NODE      02781900
            C    ( LMTHND X LMSCND )                                                02782000
ISN 0083          COMMON   EMHBTN(140,5), EMTBTN(140,5), FLOBTN(140,5)              02782100
            C  LOOP VARIABLES  ( LMNLOP )                                           02782200
ISN 0084          COMMON   DODTLP(75), OMEGLP(75), QERRLP(75), QLP(75)              02782300
            C  AERODYNAMIC MATRIX OF COEFFICIENTS - ARRAY SIZE ESTIMATED AT         02782400
            C  APPROXIMENTLY 0.05*LMSECT**2  (LMBLP)                                02782500
ISN 0085          COMMON   BLP(1000)                                                02782600
            C  LINE SEGMENT VARIABLES  ( LMLSEG )                                   02782700
ISN 0086          COMMON   ALS(90), CILS(90), CBNLS(90), CBPLS(90), CFNLS(90)       02782800
ISN 0087          COMMON   CFPLS(90), DBTLS(90), DTDELS(90), DTDMLS(90), DTHELS(90) 02782900
ISN 0088          COMMON   DTHMLS(90), DTWELS(90), DTWMLS(90), EPSLS(90), FFFLS(90) 02783000
ISN 0089          COMMON   FLS(90), LLS, LLSS, NAMLS(90,9), NTRNLS, NUMLS           02783100
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ISN 0090          COMMON   PDRYLS(90), PERMLS(90), RELS(90), RNFLS(90), RPRMLS(90)  02783200
ISN 0091          COMMON   SUPLSS(90), TABL3, TABL4, TABL8, THCNLS(2,90)            02783300
ISN 0092          COMMON   THDFLS(2,90), TSNKLS(90), TYPLS, VOLLSS(90)              02783400
            C    LINE SEGMENT BY NUMBER OF TRAINS IN LINE SEGMENT (LMLSEG X LMTRSG) 02783500
ISN 0093          COMMON   TRNNLS                                                   02783600
            C    LINE SEGMENT BY TWICE THE NUMBER OF TRAINS IN A LINE SEGMENT       02783700
            C    (LMLSEG X 2*LMTRSG)                                                02783800
ISN 0094          COMMON   TRNDLS(90,16)                                            02783900
            C  VENTILATION SHAFT SEGMENT VARIABLES  ( LMVSEG )                     02784000
ISN 0095          COMMON   AGVS(60), AVS(60), EXVGVS, FDIRVS(60), FPMXVS(60)        02784100
ISN 0096          COMMON   FPMNVS(60), FTOFVS, FTONVS, FTYPVS, LVS, LVSS            02784200
ISN 0097          COMMON   NAMVS(60,9), MNFPVS(60), MXFPVS(60), NUMVS, REVS(60)     02784300
ISN 0098          COMMON   RNFVS(60), STAKVS(60), SURVSS(60), TABL5, TABL6, TYPVS   02784400
ISN 0099          COMMON   VOLVSS(60), VOMXVS(60)                                  02784500
            C  SUBSEGMENT VARIABLES (LINE AND VENT SHAFT SUBSEGMENT)  (LMSS)       02784600
ISN 0100          COMMON   DERHSS(300), DERTSS(300), EMTBSS(300), EMTFSS(300)      02784700
ISN 0101          COMMON   EMHBSS(300), EMHFSS(300), FBSS(300), FFSS(300)          02784800
ISN 0102          COMMON   FLOBSS(300), FLOFSS(300), HRMN(300), HRMX(300)          02784900
ISN 0103          COMMON   HSUMSS(300), HTRNSS(300), HTMPSS(300), HTSMSS(300)      02785000
ISN 0104          COMMON   HUMSS(300), LHLTSS, LSUMSS, MNHR(300), MNTDR(300)       02785100
ISN 0105          COMMON   MNTWR(300), MXHR(300), MXTDR(300), MXTWR(300)           02785200
ISN 0106          COMMON   QERHSS(300), QERTSS(300), QSMXSS(300), QSUMSS(300)      02785300
ISN 0107          COMMON   SHLTSS(300), SHRSS(300), SHUXSS(300), STDRSS(300)       02785400
ISN 0108          COMMON   STDNSS(300), STDPSS(300), STWRSS(300), TABL7, TDBSS(300) 02785500
ISN 0109          COMMON   TDBMN(300), TDBMX(300), TSFSS(300), TABL44, TTMPSS(300) 02785600
ISN 0110          COMMON   TWBSS(300), TWBMN(300), TWBMX(300), VOLSS(300)          02785700
            C  LINE SUBSEGMENT VARIABLES  (LMLSS)                                  02785800
ISN 0111          COMMON   EXDTDB, LACLSS, LHLSS, SACLSS(250), SHLSS(250)          02785900
            C    LINE SUBSEGMENT BY TRAIN ROUTE  (LMLSS X LMTRRT)                  02786000
ISN 0112          COMMON   ITNLSS                                                   02786100
            C  ZONE CLUSTER VARIABLES                                              02786200
ISN 0113          COMMON   TYPCL                                                    02786300
            C  SUBWAY VEHICLE TYPE VARIABLES  ( LMTRTP )                           02786400
ISN 0114          COMMON   ACACCV(3), ACCV(3), ACDECV(3), ARACCV(3), ARDECV(3)     02786500
ISN 0115          COMMON   AV(3), CDRVOV(3), CDFVOV(3), CHPR1V(3), CHPR2V(3)       02786600
ISN 0116          COMMON   CCAMP(3,4), CCAMPL(3,6), CCATEV(3), CCBTEV(3), CORMV(3,3)02786700
ISN 0117          COMMON   CDTEV(3,4), DECAV(3), DECBV(3), DECV(3), DECV1V(3)      02786800
ISN 0118          COMMON   DIACCV(3), DIDCCV(3), EMISAG(3), EMISDG(3), LAMDAV, LHREV02786900
ISN 0119          COMMON   LV, MCPCAV, MCPCDV, MOTORV, NCARV, NOPTV(3), NPCARV     02787000
ISN 0120          COMMON   PERMV(3), RECENV(3)                                     02787100
ISN 0121          COMMON   RE1M(3), RE2M(3), RE3M(3), RRACC(3), SHPEV(3), SLOPEV(3) 02787200
ISN 0122          COMMON   SP1(3), SP2(3), SRE1M(3), SRE2M(3), TESP1(3)            02787300
ISN 0123          COMMON   TIACCV(3), TIDECV(3), UCHPRV(3), U2M(3), U3M(3), WV(3)  02787400
            C   UNDERPLATFORM EXHAUST VARIABLES                                    02787500
ISN 0124          COMMON   EFSUX, EFMUX, OPTLX, UMAXUX                             02787600
            C  ROUTE VARIABLES  ( LMTRRT )                                         02787700
ISN 0125          COMMON   COPTRT, NTSRT, ORIGRT(6), UMINRT(6)                     02787800
            C    DISPATCHER VARIABLES  ( LMTRRT ) AND ( LMTRGP X LMTRRT )          02787900
ISN 0126          COMMON   GRHOWY, GRTYPV, JGROUP, NGRV, NMTRGR, NTIMTR(6)         02788000
ISN 0127          COMMON   NTRGR, NUMTR                                            02788100
            C    TRACK SECTION VARIABLES  ( LMTSRT X LMTRRT )                      02788200
ISN 0128          COMMON   DWLTS, FSTS(260,6), GRDTS(260,6), NPFTTS                02788300
ISN 0129          COMMON   NSEGTS, RADTS(260,6), UMXTS(260,6)                      02788400
            C    EXPLICIT TRAIN PERFORMANCE VARIABLES  ( LMEXPD X LMTRRT )         02788500
ISN 0130          COMMON   NEXPDP, QGRIDV(201,6), SPEEDV(201,6), TIMEV             02788600
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                C  OPERATIONAL TRAIN VARIABLES  ( LMTRAN )                          02788700
ISN 0131            COMMON   AMPV(30), AMPLV(30), ANVV(30), DGRDQV(30), DPV, DRAGV(30)02788300
ISN 0132            COMMON   DUDTV(30), INDEX, IRUTEV, ITYPV, MODEV, NTSV           02788900
ISN 0133            COMMON   NTSV2, QACCV(30), QDECV(30), QERACV(30), QERDCV(30)     02789000
ISN 0134            COMMON   QTRPF(30), RGSUMV(30), RMHTV(30), RSISTV(30), TAAVGV(30) 02789100
ISN 0135            COMMON   TEV(30), TGACCV(30), TGDECV(30), TLPSV, TNUMV, TSTRTV   02789200
ISN 0136            COMMON   TWAVGV(30), UV(30), WPATV(30), XLASTV(30), XV(30)       02789300
                C  FAN TYPE VARIABLES  ( LMFNTP )                                   02789400
ISN 0137            COMMON   CFMHFT(4), CFMLFT(4), FN1IFT(4), FN2IFT(4), FN3IFT(4)  02789500
ISN 0138            COMMON   FN4IFT(4), FN1OFT(4), FN2OFT(4), FN3OFT(4), FN4OFT(4)  02789600
ISN 0139            COMMON   TIMFT(4)                                               02789700
                C  UNSTEADY HEAT LOAD VARIABLES  ( LMUL )                           02789800
ISN 0140            COMMON   HLLUL(10), HLSUL(10), LSSUL, LTONUL(10), LTOFUL(10)    02789900
                C  PATRON CHARACTERISTICS                                           02790000
ISN 0141            COMMON   PATWHT                                                 02790100
                C  PRINT GROUP VARIABLES  ( LMPRGP )                                02790200
ISN 0142            COMMON   GINTPR, GRABBP, GRSUM, NPRGR                           02790300
                C                                                                   02790400
ISN 0143            EQUIVALENCE  (ND(1), NDS(2), NDSS(3))                           02790500
                C                                                                   02790600
                C                                                                   02790700
                C                                                                   02790800
ISN 0144         20 FORMAT( 8F10.2 )                                                02790900
ISN 0145         21 FORMAT( 2F10.2, 9A4 )                                           02791000
ISN 0146         50 FORMAT(1H0,' INPUT VERIFICATION FOR VENTILATION SHAFT',         02791100
                  1  I5,' -',I3,T57,9A4,T113,'FORM 5A' )                            02791200
ISN 0147         52 FORMAT(1H0,' SECTION TYPE',T80,I14,T97,'(VENTILATION SHAFT)' )  02791300
ISN 0148         53 FORMAT(1H0,' SECTION TYPE',T80,I14,T97,'(STAIRWAY)' )           02791400
ISN 0149         56 FORMAT(1H0,' NUMBER OF SEGMENTS IN THIS VENT SHAFT', T80,I14,T113,02791500
                  1'FORM 5B')                                                       02791600
ISN 0150         57 FORMAT(1H0,' NUMBER OF SUBSEGMENTS IN RESULTING EQUIVALENT VENT SH02791700
                  1AFT',  T80,I14 )                                                 02791800
ISN 0151         58 FORMAT(1H0,' GRATE FREE AREA',T80,F14.1,T97,'SQ FT')            02791900
ISN 0152         59 FORMAT(1H0,' DESIGN MAXIMUM OUTFLOW AIR VELOCITY AT GRATE',     02792000
                  1  T80,F14.0,T97,'FPM'   )                                        02792100
ISN 0153         61 FORMAT(1H0,' WALL SURFACE TEMPERATURE', T80,F14.1,T97,'DEG F' ) 02792200
ISN 0154         62 FORMAT(1H0,' INITIAL AIR DRY-BULB TEMPERATURE',T80,F14.1,       02792300
                  1  T97,'DEG F' )                                                  02792400
ISN 0155         63 FORMAT(1H0,' INITIAL AIR WET-BULB TEMPERATURE',T80,F14.1,       02792500
                  2  T97,'DEG F' )                                                  02792600
ISN 0156         64 FORMAT(1H0,' STACK HEIGHT',T80,F14.1,T97,'FT' )                 02792700
ISN 0157         65 FORMAT(1H0,' FAN TYPE',T80,I14,T113,'FORM 5C')                  02792800
ISN 0158         66 FORMAT(1H0,' FAN TYPE',T80,I14,T97,'(NO FAN)',T113,'FORM 5C')   02792900
ISN 0159         68 FORMAT(1H0,' SIMULATION TIME AFTER WHICH FAN SWITCHES ON',      02793000
                  1  T80,I14,T97,'SECONDS' )                                        02793100
ISN 0160         69 FORMAT(1H0,' SIMULATION TIME AFTER WHICH FAN SWITCHES OFF',     02793200
                  1  T80,I14,T97,'SECONDS' )                                        02793300
ISN 0161         70 FORMAT(1H0,' DIRECTION OF FAN OPERATION',T80,I14,               02793400
                  1  T97,'(OUTFLOW OR EXHAUST)' )                                  02793500
ISN 0162         71 FORMAT(1H0,' DIRECTION OF FAN OPERATION',T80,I14,               02793600
                  1  T97,'(INFLOW OR SUPPLY)' )                                    02793700
ISN 0163         75 FORMAT(1H0,' SEGMENT CHARACTERISTICS',T113,'FORM 5D'/           02793800
                  1  T70,'SEGMENT TOTAL HEAD LOSS COEFFICIENTS' //                 02793900
                  2  T18,'LENGTH',T34,'AREA',T47,'PERIMETER',T66,'FORWARD',        02794000
                  3  T77,'FORWARD',T91,'BACKWARD',T102,'BACKWARD' /                02794100
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                4  T19,'(FT)',T33,'(SQ FT)',T50,'(FT)',T66,'POSITIVE',
                5  T77,'NEGATIVE',T91,'POSITIVE',T102,'NEGATIVE' /)
ISN 0164       77 FORMAT( T7,I4,F12.1,F15.1,F15.1,F19.2,F11.2,F14.2,F11.2 )
ISN 0165       80 FORMAT(1H0,' EQUIVALENT VENTILATION SHAFT PROPERTIES' /
                1  1H0,T2,'LENGTH',T25,F11.1,3X,'FT',
                2  T67,'TOTAL HEAD CHANGE COEFFICIENTS' /
                3  1H0,T8,'AREA',T25,F11.1,3X,'SQ FT',T60,'POSITIVE FLOW',F15.2/
                4  1H0,T8,'PERIMETER',T25,F11.1,3X,'FT',T60,'NEGATIVE FLOW'F15.2)
            C
            C      INPUT FORM 5A
            C
ISN 0166           READ(IN,21) DUMY1, DUMY2, (NAMVS(IVS,J),J=1,9)
ISN 0167           NUMY1=DUMY1
ISN 0168           NUMVS(IVS)=NUMY1
ISN 0169           TYPVS(IVS) = DUMY2
ISN 0170           ISCT = NLSEC + IVS
ISN 0171           ISCTX = TABL11( ISCT )
ISN 0172           WRITE(OUT,50) ISCTX, NUMY1, (NAMVS(IVS,J),J=1,9)
ISN 0173           CALL CHECKI( NUMY1, 1, 999, 149 )
            C---- CHECK FOR DUPLICATE I.D. NUMBERS
ISN 0174           NUMY1 = IVS - 1
ISN 0175           IF( NUMY1 ) 104,104,101
ISN 0176      101 DO  103  J = 1, NUMY1
ISN 0177           IF( NUMVS(J) - NUMVS(IVS) ) 103,102,103
ISN 0178      102 CALL ERROR( 162 )
ISN 0179      103 CONTINUE
ISN 0180      104 DO  1042  J=1,NLS
ISN 0181           IF( NUMLS(J) - NUMVS(IVS) ) 1042,1041,1042
ISN 0182     1041 CALL ERROR( 162 )
ISN 0183     1042 CONTINUE
ISN 0184           IF( TYPVS(IVS) ) 108,108,105
ISN 0185      105 IF( TYPVS(IVS) - 2 ) 106,107,108
ISN 0186      106 WRITE(OUT,52) TYPVS(IVS)
ISN 0187           GO TO 110
ISN 0188      107 WRITE(OUT,53) TYPVS(IVS)
ISN 0189           GO TO 110
ISN 0190      108 WRITE(OUT,52) TYPVS(IVS)
ISN 0191           CALL ERROR( 167 )
ISN 0192           TYPVS(IVS) = 1
            C
            C      INPUT FORM 5B
            C
ISN 0193      110 READ(IN,20) DUMY1,DUMY2,AGVS(IVS),VCMXVS(IVS),DUMY3,DUMY4,
                1  DUMY5, STAKVS(IVS)
ISN 0194           NVSEG = DUMY1
ISN 0195           WRITE(OUT,56) NVSEG
ISN 0196           IF( NVSEG ) 111,111,112
ISN 0197      111 CALL ERROR( 172 )
ISN 0198           GO TO 990
ISN 0199      112 NSS = DUMY2
ISN 0200           WRITE(OUT,57) NSS
ISN 0201           CALL CHECKI( NSS, 1, LMSS, 42 )
            C---- ASSIGN SUBSEGMENT LOCATIONS
ISN 0202           ISSL = INSS + 1
ISN 0203           TABL5(IVS) = ISSL
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ISN 0204          TNSS = TASS + NSS                                    02799700
ISN 0205          TABL6(IVS) = TNSS                                    02799800
ISN 0206          DO 114 ISS = ISSL,TASS                               02799900
ISN 0207      114 TABL7(ISS) = -IVS                                    02800000
ISN 0208          CALL CHECKI( TNSS, 1, LMSS, 43 )                     02800100
ISN 0209          GO TO ( 990, 120 ), NEW                              02800200
ISN 0210      120 WRITE(OUT,58) AGVS(IVS)                              02800300
ISN 0211          CALL CHECKR( AGVS(IVS), 3.0, 3000.0, 38 )            02800400
ISN 0212          WRITE(OUT,59) VOMXVS(IVS)                            02800500
ISN 0213          CALL CHECKR( VOMXVS(IVS), 0.0, 6000.0, 169 )         02800600
ISN 0214          VOMXVS(IVS) = VOMXVS(IVS) / 60.0                     02800700
ISN 0215          WRITE(OUT,61) DUMY3                                  02800800
ISN 0216          CALL CHECKR(DUMY3,0.0,130.0,23)                      02800900
ISN 0217          WRITE(OUT,62) DUMY4                                  02801000
ISN 0218          CALL CHECKR( DUMY4, 0.0, 130.0, 24 )                 02801100
ISN 0219          WRITE(OUT,63) DUMY5                                  02801200
ISN 0220          CALL CHECKR( DUMY5, 0.0, DUMY4, 25 )                 02801300
ISN 0221          WRITE(OUT,64) STAKVS(IVS)                            02801400
ISN 0222          CALL CHECKR( STAKVS(IVS), 0.0, 1000.0, 37 )          02801500
ISN 0223          CALL LATENT( DUMY4, DUMY5, DUMY6 )                   02801600
            C---- LOOP OVER SUBSEGMENTS IN VENT SHAFT                  02801700
ISN 0224          DO  130  ISS = ISSL, TASS                            02801800
ISN 0225          QERTSS(ISS) = 0.0                                    02801900
ISN 0226          QERHSS(ISS) = 0.0                                    02802000
ISN 0227          LHLTSS(ISS) = 0.0                                    02802100
ISN 0228          SHLTSS(ISS) = 0.0                                    02802200
ISN 0229          SHUXSS(ISS) = 0.0                                    02802210
ISN 0230          FESS(ISS) = 0.0                                      02802220
ISN 0231          FBSS(ISS) = 0.0                                      02802230
ISN 0232          HTRNSS(ISS) = 0.0                                    02802240
ISN 0233          TSFSS(ISS) = DUMY3                                   02802300
ISN 0234          TDBSS(ISS) = DUMY4                                   02802400
ISN 0235          TTMPSS(ISS) = DUMY4                                  02802500
ISN 0236          TWBSS(ISS) = DUMY5                                   02802600
ISN 0237          HUMSS(ISS) = DUMY6                                   02802700
ISN 0238      130 HTMPSS(ISS) = DUMY6                                  02802800
            C                                                          02802900
            C---- FAN INFORMATION                FORM 5C               02803000
ISN 0239          IF( NFNTYP ) 151,151,132                             02803100
ISN 0240      132 READ(IN,20) DUMY1,DUMY2,DUMY3,DUMY4                  02803200
ISN 0241          FTYPVS(IVS) = DUMY1                                  02803300
ISN 0242          IF( FTYPVS(IVS) ) 155,150,155                        02803400
ISN 0243      150 WRITE(OUT,66) FTYPVS(IVS)                            02803500
ISN 0244      151 FTYPVS(IVS) = 0                                      02803600
ISN 0245          FDIRVS(IVS) = 0.0                                    02803700
ISN 0246          FTONVS(IVS) = 0                                      02803800
ISN 0247          FTOFVS(IVS) = 0                                      02803900
ISN 0248          GO TO 170                                            02804000
ISN 0249      155 WRITE(OUT,65) FTYPVS(IVS)                            02804100
ISN 0250          IF( FTYPVS(IVS) - NFNTYP ) 157,157,156               02804200
ISN 0251      156 CALL ERROR( 170 )                                    02804300
ISN 0252      157 IF( TYPVS(IVS) - 2 ) 160,158,160                     02804400
ISN 0253      158 CALL ERROR( 171 )                                    02804500
ISN 0254      160 FTONVS(IVS) = DUMY2                                  02804600
ISN 0255          FTOFVS(IVS) = DUMY3                                  02804700
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ISN 0256          WRITE(OUT,68) FTONVS(IVS)                                    02804800
ISN 0257          WRITE(OUT,69) FTOFVS(IVS)                                    02804900
ISN 0258          IF( FTONVS(IVS) - FTOFVS(IVS) ) 164,164,161                  02805000
ISN 0259      161 CALL ERROR( 76 )                                             02805100
ISN 0260      164 FTONVS(IVS) = FTONVS(IVS) * 100 + 1                          02805200
ISN 0261          FTOFVS(IVS) = FTOFVS(IVS) * 100                              02805300
ISN 0262          NUMY1 = DUMY4                                                02805400
ISN 0263          IF( NUMY1 ) 166,165,165                                      02805500
ISN 0264      165 WRITE(OUT,70) NUMY1                                          02805600
ISN 0265          FDIRVS(IVS) = 1.0                                            02805700
ISN 0266          GO TO 167                                                    02805800
ISN 0267      166 WRITE(OUT,71) NUMY1                                          02805900
ISN 0268          FDIRVS(IVS) = -1.0                                           02806000
            C---- DETERMINE SIGN OF OUTFLOW OR EXHAUST                         02806100
ISN 0269      167 NODE = TABL12( ISCT )                                        02806200
ISN 0270          IF( TABL16( NODE ) - 1 ) 170,168,170                         02806300
            C --  BACKWARD END IS CONNECTED TO ATMOSPHERE - REVERSE DIRECTION SIGN  02806400
ISN 0271      168 FDIRVS(IVS) = - FDIRVS(IVS)                                  02806500
            C                                                                  02806600
            C---- SEGMENT CHARACTERISITCS - COMPUTE EQUIVALENT VENT SHAFT   FORM 5D 02806700
ISN 0272      170 WRITE(OUT,75)                                                02806800
ISN 0273          CEPS(ISCT) = 0.0                                             02806900
ISN 0274          CENS(ISCT) = 0.0                                             02807000
ISN 0275          X3 = 0.0                                                     02807100
ISN 0276          X4 = 0.0                                                     02807200
ISN 0277          X5 = 0.0                                                     02807300
ISN 0278          X6 = 0.0                                                     02807400
            C---- READ SEGMENT PROPERTIES AND COMPUTE SUMMATIONS               02807500
ISN 0279          DO  240  ISEG = 1, NVSEG                                     02807600
ISN 0280          READ(IN,20) DUMY1,DUMY2, DUMY3, DUMY4, DUMY5, DUMY6, DUMY7   02807700
ISN 0281          WRITE(OUT,77) ISEG,DUMY1,DUMY2,DUMY3,DUMY4,DUMY5,DUMY6,DUMY7 02807800
            C --  LENGTH                                                       02807900
ISN 0282          CALL CHECKR( DUMY1, 0.0, 2000.0, 40 )                        02808000
            C --  AREA                                                         02808100
ISN 0283          CALL CHECKR( DUMY2, 3.0, 3000.0, 38 )                        02808200
            C --  PERIMETER                                                    02808300
ISN 0284          CALL CHECKR( DUMY3, 5.0, 500.0, 39 )                         02808400
            C --  FORWARD POSITIVE                                             02808500
ISN 0285          CALL CHECKR( DUMY4, 0.0, 300.0, 28 )                         02808600
            C --  FORWARD NEGATIVE                                             02808700
ISN 0286          CALL CHECKR( DUMY5, 0.0, 300.0, 28 )                         02808800
            C --  BACKWARD POSITIVE                                            02808900
ISN 0287          CALL CHECKR( DUMY6, 0.0, 300.0, 28 )                         02809000
            C --  BACKWARD NEGATIVE                                            02809100
ISN 0288          CALL CHECKR( DUMY7, 0.0, 300.0, 28 )                         02809200
ISN 0289          DUMY8 = (4.0*PI*DUMY2)**0.5                                  02809300
ISN 0290          IF( DUMY3 - DUMY8 ) 153,180,180                              02809400
ISN 0291      153 CALL ERROR( 70 )                                             02809500
            C                                                                  02809600
ISN 0292      180 IF(ISEG-1) 185,185,190                                       02809700
ISN 0293      185 ALOWS(ISCT) = DUMY2                                          02809800
ISN 0294      190 IF(NVSEG-ISEG) 195,195,200                                   02809900
ISN 0295      195 AHIGHS(ISCT) = DUMY2                                         02810000
ISN 0296      200 CEPS(ISCT) = CEPS(ISCT) + 0.25 * (DUMY4 + DUMY6) / (DUMY2 * DUMY2)02810100
ISN 0297          CENS(ISCT) = CENS(ISCT) + 0.25 * (DUMY5 + DUMY7) / (DUMY2 * DUMY2)02810200
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                C***** SUM OF L OVER A                                          02810300
ISN 0298              X3 = X3 + DUMY1/DUMY2                                     02810400
                C --  SUM OF SURFACE AREA                                       02810500
ISN 0299              X4 = X4 + DUMY1 * DUMY3                                   02810600
                C --  SUM OF VOLUME                                             02810700
ISN 0300              X5 = X5 + DUMY1 * DUMY2                                   02810800
                C*****SUM OF LENGTHS                                            02810900
ISN 0301          240 X6 = X6 + DUMY1                                           02811000
ISN 0302              AVS(IVS) = SQRT(X5/X3)                                    02811100
ISN 0303              LVS(IVS) = SQRT(X5*X3)                                    02811200
ISN 0304              BS(ISCT) = X3                                             02811300
ISN 0305              BCS(ISCT)=BS(ISCT)                                        02811400
ISN 0306              PERIM = X4 / LVS(IVS)                                     02811500
ISN 0307              RNEVS(IVS)=4.0*RHOMAS/(PERIM*VISAIR)                      02811600
ISN 0308              DUMY1=4.0*AVS(IVS)*AVS(IVS)*CEPS(ISCT)                    02811700
ISN 0309              DUMY2=4.0*AVS(IVS)*AVS(IVS)*CENS(ISCT)                    02811800
ISN 0310              WRITE(OUT,80) LVS(IVS),AVS(IVS),DUMY1,PERIM,DUMY2         02811900
ISN 0311              VOLVSS(IVS) = X5 / FLOAT( NSS )                           02812000
ISN 0312              SURVSS(IVS) = X4 / FLOAT( NSS )                           02812100
                C---- CHECK IF STACK HEIGHT EXCEEDS SUM OF INDIVIDUAL LENGTHS    02812200
ISN 0313              IF( STAKVS(IVS) - X6 ) 255,255,250                        02812300
ISN 0314          250 CALL ERROR( 173 )                                         02812400
ISN 0315          255 STAKVS(IVS)=STAKVS(IVS)*GRACC                             02812500
ISN 0316              LVSS(IVS)=LVS(IVS)/NSS                                    02812600
ISN 0317              CALL CHECKR(X6,10.0,2000.0,190)                           02812700
ISN 0318          990 RETURN                                                    02812800
ISN 0319              END                                                       02812900
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          COMPILER OPTIONS - NAME=  MAIN,OPT=02,LINECNT=57,SIZE=0000K,
                             SOURCE,EBCDIC,NOLIST,NODECK,LOAD,MAP,NOEDIT,ID,NOXREF
 ISN 0002            SUBROUTINE INPUT                                          01029400
                 C                                                             01029500
                 C   THIS SUBROUTINE CONTROLS THE READING,CHECKING, AND INPUT  01029600
                 C   VERIFICATION OF ALL THE INPUT DATA. SOME DATA IS READ BY THIS 01029700
                 C   SUBROUTINE. AND SOME IS READ BY OTHER SUBROUTINES WHICH READ 01029800
                 C   CERTAIN ITEMS OF DATA. THESE ARE -                        01029900
                 C            LSINS  - LINE SEGMENT INPUT SUBROUTINE           01030000
                 C            VSINS  - VENTILATION SHAFT INPUT SUBROUTINE      01030100
                 C            TRINS  - TRAIN ROUTE INPUT SUBROUTINE            01030200
                 C            GARAGE - TRAIN 'TYPE' INPUT SUBROUTINE           01030300
                 C                                                             01030400
                 C   OTHER SUBROUTINES WHICH ARE USED ARE -                    01030500
                 C            CHECKI - CHECKS INTEGER VARIABLE BETWEEN TWO LIMITS 01030600
                 C            CHECKR - CHECKS REAL VARIABLE BETWEEN TWO LIMITS 01030700
                 C            ERROR  - WRITES ERROR MESSAGES                   01030800
                 C                                                             01030900
                 C                                                             01031000
 ISN 0003            DIMENSION    MONTHS(2,12), NUMMY1(18)                     01031100
 ISN 0004            DIMENSION    DUMMY1(8), NUMMY2(8),NUMMY3(8),NUMMY4(8),NUMMY5(8) 01031200
                 C                                                             01031300
                 C                                                             01031400
                 C   INCLUDE  DSHARE                                           01031500
                 C                                                             01031600
                 C ************************ INTEGER VARIABLES ************************ C01031700
                 C                                                             01031800
                 C  GENERAL VARIABLES                                          01031900
 ISN 0005            INTEGER   AFTIME, BLANK, BLPREQ, DATE(8), DEATH, DESPER, ESCFT 01032000
 ISN 0006            INTEGER   HCOPT, HSOPT, HUMOPT, OUT, PRTIME, SLASH, SUPOPT 01032100
 ISN 0007            INTEGER   SYSTEM(18), THOPT, THTIME, TNLSS, TNSS, TPOPT, TRTIME 01032200
                 C  SECTION VARIABLES  (LMSECT)                                01032300
 ISN 0008            INTEGER   NTOPS(140)                                      01032400
 ISN 0009            INTEGER   TABL9(140), TABL10(140), TABL11(140), TABL12(140) 01032500
 ISN 0010            INTEGER   TABL13(140), TABL20(140), TABL21(140)           01032600
                 C    SECTION (LMSECT), SECTION+ONE  (LMSECT+1) ,  SECTION+TWO (LMSECT+2)01032700
 ISN 0011            INTEGER   ND(140), NDS(141), NDSS(142)                    01032800
                 C    SECTION * ESTIMATED AVERAGE OF 3 LOOPS THROUGH SECTION ( LMLPK ) 01032900
 ISN 0012            INTEGER   LKAN(420)                                       01033000
                 C    SECTION EXTERNAL IDENTIFICATION NUMBERS (LMSCTX)         01033100
 ISN 0013            INTEGER   TABL14(400)                                     01033200
                 C  NODE VARIABLES  (LMNODE)                                   01033300
 ISN 0014            INTEGER   TABL1(132), TABL15(130), TABL16(130), TABL22(130) 01033400
 ISN 0015            INTEGER   TABL23(132), TABL45(130), TYPTND(130)           01033500
                 C  AERODYNAMIC NODE VARIABLES (LMTBL2)                        01033600
 ISN 0016            INTEGER   TABL2(1500)                                     01033700
                 C    NODES BY NUMBER OF SECTIONS CONNECTED TO NODE (LMNODE X LMSCND) 01033800
 ISN 0017            INTEGER   TABL17(130,5), TABL18(130,5)                    01033900
                 C    NODE EXTERNAL IDENTIFICATION NUMBERS (LMSCTX)            01034000
 ISN 0018            INTEGER   TABL19(400)                                     01034100
                 C  LOOP VARIABLES  (LMNLOP)                                   01034200
                 C  LINE SEGMENT VARIABLES  (LMLSEG)                           01034300
 ISN 0019            INTEGER   NTRNLS(90), NUMLS(90), TABL3(90), TABL4(90), TABL8(90) 01034400
 ISN 0020            INTEGER   TYPLS(90)                                       01034500
                 C    LINE SEGMENT BY NUMBER OF TRAINS IN SEGMENT  (LMLSEG X LMTRSG) 01034600
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ISN 0021          INTEGER   TRNNLS(90,8)                                          01034700
            C  VENTILATION SHAFT SEGMENT VARIABLES     ( LMVSEG )                 01034800
ISN 0022          INTEGER   FTOFVS(60), FTONVS(60), NUMVS(60)                     01034900
ISN 0023          INTEGER   TABL6(60), TYPVS(60), EXVOVS(60), FTYPVS(60), TABL5(60) 01035000
            C  SUBSEGMENT VARIABLES  (LMSS)                                       01035100
ISN 0024          INTEGER   TABL7(300), TABL44(300)                               01035200
            C  LINE SUBSEGMENT VARIABLES   ( LMLSS X TABLE SIZE )                 01035300
ISN 0025          INTEGER   EXDTOB(250,6)                                         01035400
            C    LINE SUBSEGMENT BY TRAIN ROUTE ( LMLSS X LMTRRT )                01035500
ISN 0026          INTEGER   ITNLSS(250,6)                                         01035600
            C  HEATING OR COOLING ZONE CLUSTER VARIABLES  (LMCLST)                01035700
ISN 0027          INTEGER   TYPCL(30)                                             01035800
            C  SUBWAY VEHICLE TYPE VARIABLES  (LMTRTP)                            01035900
ISN 0028          INTEGER   NCARV(3), NPCARV(3)                                   01036000
            C  UNDERPLATFORM EXHAUST VARIABLES                                    01036100
ISN 0029          INTEGER   OPTUX                                                 01036200
            C  ROUTE VARIABLES  (LMTRRT)                                          01036300
ISN 0030          INTEGER   COPTRT(6), NTSRT(6)                                   01036400
            C    DISPATCHER VARIABLES (LMTRRT) AND (LMTRGP X LMTRRT)              01036500
ISN 0031          INTEGER   GRTYPV(15,6), JGROUP(6), NGRV(6), NMTRGR(6)           01036600
ISN 0032          INTEGER   NTRGR(15,6)                                           01036700
ISN 0033          INTEGER   GPHDWY(15,6)                                          01036800
            C    TRACK SECTION VARIABLES  (LMTSRT X LMTRRT)                       01036900
ISN 0034          INTEGER   DWLTS(260,6)                                          01037000
ISN 0035          INTEGER   NPETTS(260,6), NSEGTS(260,6)                          01037100
            C    EXPLICIT TRAIN PERFORMANCE VARIABLES  (LMEXPD X LMTRRT)          01037200
ISN 0036          INTEGER   NEXPDP(6)                                             01037300
ISN 0037          INTEGER   TIMEV(201,6)                                          01037400
            C  OPERATIONAL TRAIN VARIABLES  (LMTRAN)                              01037500
ISN 0038          INTEGER   DPV(30), INDEX(30), IROTEV(30), ITYPV(30), MODEV(30)  01037600
ISN 0039          INTEGER   NTSV(30), NTSV2(30), TNUMV(30)                        01037700
ISN 0040          INTEGER   TIPSV(30), TSTRTV(30)                                 01037800
            C  FAN TYPE VARIABLES  (LMFNTP)                                       01037900
            C  UNSTEADY HEAT LOAD VARIABLES  ( LMUL )                             01038000
ISN 0041          INTEGER   LSSUL(10)                                             01038100
            C  PRINT GROUP VARIABLES  ( LMPRGP )                                  01038200
ISN 0042          INTEGER   GINTPR(15), GRABBP(15), GRSUM(15), NPRGR(15)          01038300
            C                                                                     01038400
            C ************************* REAL VARIABLES ************************* C01038500
            C                                                                     01038600
            C  GENERAL VARIABLES                                                  01038700
ISN 0043          REAL      NUAIR, MPHFPS                                         01038800
            C  SECTION VARIABLES                                                  01038900
            C  NODE VARIABLES                                                     01039000
            C  LOOP VARIABLES                                                     01039100
            C  LINE SEGMENT VARIABLES                                             01039200
ISN 0044          REAL      LLS(90), LLSS(90)                                     01039300
            C  VENTILATION SHAFT SEGMENT VARIABLES                                01039400
ISN 0045          REAL      LVS(60), LVSS(60)                                     01039500
            C  SUBSEGMENT VARIABLES                                               01039600
ISN 0046          REAL      LHLTSS(300), LSUMSS(300)                              01039700
            C  LINE SUBSEGMENT VARIABLES                                          01039800
ISN 0047          REAL      LACLSS(250), LHLSS(250)                               01039900
            C  ZONE VARIABLES                                                     01040000
            C  SUBWAY VEHICLE TYPE VARIABLES                                      01040100
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ISN 0048          REAL      LAMDAV(3), LHREV(3), LV(3), MCPGAV(3), MCPGDV(3)          01040200
ISN 0049          REAL      MOTORV(3)                                                 01040300
            C  ROUTE VARIABLES                                                        01040400
            C    DISPATCHER VARIABLES                                                 01040500
            C    TRACK SECTION VARIABLES                                              01040600
            C    EXPLICIT TRAIN PERFORMANCE VARIABLES                                 01040700
            C  OPERATIONAL TRAIN VARIABLES                                            01040800
            C  FAN TYPE VARIABLES                                                     01040900
            C  PRINT GROUP VARIABLES                                                  01041000
            C                                                                         01041100
            C ****************************** COMMON ****************************** C01041200
            C                                                                         01041300
            C GENERAL VARIABLES                                                       01041400
ISN 0050          COMMON    AFTIME, ANNAMP, BLANK, BLPREC, DATE, DEATH                01041500
ISN 0051          COMMON    DELAE, DELP, DELT, DELTH, DELTR, DEL2TH, DESPER, FSCFT    01041600
ISN 0052          COMMON    HCOPT, HMAMBF, HMAMBM, HOUR, HSOPT, HUMAMB, HUMOPT        01041700
ISN 0053          COMMON    IEQUAT, IN, INODE, IPRGRP, ISITU, JRATAE, JRATTH, JRATTR 01041800
ISN 0054          COMMON    KAERO, KASTEP, KBND1, KBND2, KBND3, KPRNTH, KTSTEP, LIFE 01041900
ISN 0055          COMMON    LINES, MAXTIM, MONTH, MXMNPT, NBR, NBRJCT, NCLUST, NDELT 01042000
ISN 0056          COMMON    NDTYPA, NEW, NENTYP, NLOOP, NLS, NLSCPI, NLSEC, NNODE     01042100
ISN 0057          COMMON    NOSUMY, NOSYS, NOTRAN, NPGRP, NPORTL, NSEC, NSIMER        01042200
ISN 0058          COMMON    NTIME, NTNODE, NTRAN, NTRRTE, NTRTYP, NUMUL, NVSEC        01042300
ISN 0059          COMMON    NZONE, OUT, PAMB, PRTIME, SLASH                           01042400
ISN 0060          COMMON    SUMTST, SUPOPT, SYSTEM, TAMBA, TAMBM, TDRAMB              01042500
ISN 0061          COMMON    THOPT, THTIME, TNLSS, TNSS, TPOPT, TRTIME, TWBAMB, TWAMBE01042600
ISN 0062          COMMON    TWAMBM, WNTSUP                                            01042700
            C  ARRAY SIZE LIMITS                                                      01042800
ISN 0063          COMMON    LMBLP,LMCLST,LMCOND,LMFORM, LMEXPD, LMFNTP, LMLPK, LMLPLK01042900
ISN 0064          COMMON    LMLSEG, LMLSS, LMNLOP, LMNODE, LMNODX, LMPRGP, LMSCND     01043000
ISN 0065          COMMON    LMSCTX, LMSECT, LMSS, LMSSTN, LMTBL2, LMTHND, LMTRAN      01043100
ISN 0066          COMMON    LMTRGP, LMTRRT, LMTRSG, LMTRTP, LMTSRT, LMUL, LMVSEG      01043200
            C  PHYSICAL CONSTANTS                                                     01043300
ISN 0067          COMMON    AFTEMP, BTUFLB, CP, FLBBTU, FLBHP, FPSMPH, FTIN, GRACC    01043400
ISN 0068          COMMON    HVH2O, MPHFPS, NUAIR, PI, PR, RORYAR, RHOCP, RHOMAS       01043500
ISN 0069          COMMON    RHOWHT, SAINHG, SAPSI, STEFAN, THCON, TONLB, VISAIR       01043600
ISN 0070          COMMON    WGCONS, WTBTUS                                            01043700
            C  SECTION VARIABLES  ( LMSECT )                                          01043800
ISN 0071          COMMON    AHIGHS(140), ALOWS(140), BCS(140), BS(140), CEPS(140)     01043900
ISN 0072          COMMON    CFMS(140), DODTS(140), MNQS(140), MXQS(140), NTQPS        01044000
ISN 0073          COMMON    OMEGS(140), QS(140), QSAVES(140), QSMX(140), QSMN(140)    01044100
ISN 0074          COMMON    SUMQNS(140), SUMQPS(140), TABL9, TABL10, TABL11, TABL12   01044200
ISN 0075          COMMON    TABL13, TABL20, TABL21, VHIGHS(140), VLOWS(140)           01044300
            C    SECTION + TWO  (LMSECT+2)                                            01044400
ISN 0076          COMMON    NDSS                                                      01044500
            C    SECTION * ESTIMATED AVERAGE OF 3 LOOPS THROUGH SECTION ( LMLPLK )    01044600
ISN 0077          COMMON    LKAN                                                      01044700
            C    SECTION EXTERNAL IDENTIFICATION NUMBERS                              01044800
ISN 0078          COMMON    TABL14                                                    01044900
            C  NODE VARIABLES  ( LMNODE )                                             01045000
ISN 0079          COMMON    TABL1, TABL15, TABL16, TABL17, TABL18, TABL22, TABL23     01045100
ISN 0080          COMMON    TABL45, TYPTND                                            01045200
            C    NODE EXTERNAL IDENTIFICATION NUMBERS                                 01045300
ISN 0081          COMMON    TABL19                                                    01045400
            C  AERODYNAMIC NODE VARIABLES  (LMTBL2)                                   01045500
ISN 0082          COMMON    TABL2                                                     01045600
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                C  AERODYNAMIC JUNCTION COEFFICIENTS ( LMCOND )                          01045700
ISN 0083           COMMON   COAEND(950)                                                 01045800
                C  THERMODYNAMIC NODE VARIABLES  ( LMTHND )                              01045900
ISN 0084           COMMON   HAVGTN(140), HUMTN(140), TAVGTN(140), TDBTN(140)             01046000
                C    THERMODYNAMIC NODES BY NUMBER OF SECTIONS CONNECTED TO A NODE       01046100
                C    ( LMTHND X LMSCND )                                                 01046200
ISN 0085           COMMON   EMHBTN(140,5), EMTBTN(140,5), FLCBTN(140,5)                 01046300
                C  LOOP VARIABLES  ( LMNLCP )                                            01046400
ISN 0086           COMMON   DCDTLP(75), CMFGLP(75), QERRLP(75), QLP(75)                 01046500
                C  AERODYNAMIC MATRIX OF COEFFICIENTS - ARRAY SIZE ESTIMATED AT          01046600
                C  APPROXIMENTLY 0.05*LMSECT**2  (LMBLP)                                 01046700
ISN 0087           COMMON   BLP(1000)                                                   01046800
                C  LINE SEGMENT VARIABLES  ( LMLSEG )                                    01046900
ISN 0088           COMMON   ALS(90), CILS(90), CBNLS(90), CBPLS(90), CFNLS(90)          01047000
ISN 0089           COMMON   CFPLS(90), DBTLS(90), DTDELS(90), DTDMLS(90), DTHELS(90)    01047100
ISN 0090           COMMON   DTHMLS(90), DTWELS(90), DTWMLS(90), FDSLS(90), FFFLS(90)    01047200
ISN 0091           COMMON   FLS(90), LLS, LLSS, NAMLS(90,9), NTRNLS, NUMLS              01047300
ISN 0092           COMMON   PDRYLS(90), PERMLS(90), RELS(90), RNFLS(90), RPRMLS(90)     01047400
ISN 0093           COMMON   SURLSS(90), TABL3, TABL4, TABL8, THCNLS(2,90)               01047500
ISN 0094           COMMON   THDFLS(2,90), TSNKLS(90), TYPLS, VOLLSS(90)                 01047600
                C    LINE SEGMENT BY NUMBER OF TRAINS IN LINE SEGMENT (LMLSEG X LMTRSG) 01047700
ISN 0095           COMMON   TRNNLS                                                      01047800
                C    LINE SEGMENT BY TWICE THE NUMBER OF TRAINS IN A LINE SEGMENT        01047900
                C    (LMLSEG X 2*LMTRSG)                                                 01048000
ISN 0096           COMMON   TRNDLS(90,16)                                               01048100
                C  VENTILATION SHAFT SEGMENT VARIABLES  ( LMVSEG )                       01048200
ISN 0097           COMMON   AGVS(60), AVS(60), EXVOVS, FDIRVS(60), FPMXVS(60)           01048300
ISN 0098           COMMON   FPMNVS(60), FTOFVS, FTONVS, FTYPVS, LVS, LVSS               01048400
ISN 0099           COMMON   NAMVS(60,9), MNFPVS(60), MXFPVS(60), NUMVS, REVS(60)        01048500
ISN 0100           COMMON   RNFVS(60), STAKVS(60), SURVSS(60), TABL5, TABL6, TYPVS      01048600
ISN 0101           COMMON   VOLVSS(60), VOMXVS(60)                                      01048700
                C  SUBSEGMENT VARIABLES (LINE AND VENT SHAFT SUBSEGMENT)  (LMSS)         01048800
ISN 0102           COMMON   DERHSS(300), DERTSS(300), EMTBSS(300), EMTFSS(300)          01048900
ISN 0103           COMMON   EMHBSS(300), EMHFSS(300), FBSS(300), FFSS(300)              01049000
ISN 0104           COMMON   FLCBSS(300), FLCFSS(300), HRMN(300), HRMX(300)              01049100
ISN 0105           COMMON   HSUMSS(300), HTRNSS(300), HTMPSS(300), HTSMSS(300)          01049200
ISN 0106           COMMON   HUMSS(300), LHLTSS, LSUMSS, MNHR(300), MNTDB(300)           01049300
ISN 0107           COMMON   MNTWB(300), MXHR(300), MXTDB(300), MXTWB(300)               01049400
ISN 0108           COMMON   QERHSS(300), QERTSS(300), QSMXSS(300), QSUMSS(300)          01049500
ISN 0109           COMMON   SHLTSS(300), SHRSS(300), SHUXSS(300), STDBSS(300)           01049600
ISN 0110           COMMON   STDNSS(300), STDPSS(300), STWBSS(300), TABL7, TDBSS(300)    01049700
ISN 0111           COMMON   TDBMN(300), TDBMX(300), TSFSS(300), TABL44, TTMPSS(300)     01049800
ISN 0112           COMMON   TWBSS(300), TWBMN(300), TWBMX(300), VOLSS(300)              01049900
                C  LINE SUBSEGMENT VARIABLES  (LMLSS)                                    01050000
ISN 0113           COMMON   EXDTDB, LACLSS, LHLSS, SACLSS(250), SHLSS(250)              01050100
                C    LINE SUBSEGMENT BY TRAIN ROUTE  (LMLSS X LMTRRT)                    01050200
ISN 0114           COMMON   ITNLSS                                                      01050300
                C  ZONE CLUSTER VARIABLES                                                01050400
ISN 0115           COMMON   TYPCL                                                       01050500
                C  SUBWAY VEHICLE TYPE VARIABLES  ( LMTRTP )                             01050600
ISN 0116           COMMON   ACACCV(3), ACCV(3), ACDECV(3), ARACCV(3), ARDECV(3)         01050700
ISN 0117           COMMON   AV(3), CDBVOV(3), CDFVOV(3), CHPR1V(3), CHPR2V(3)           01050800
ISN 0118           COMMON   COAMP(3,4), COAMPL(3,6), COATEV(3), COBTEV(3), CORMV(3,3)01050900
ISN 0119           COMMON   COTEV(3,4), DECAV(3), DECBV(3), DECV(3), DECV1V(3)          01051000
ISN 0120           COMMON   DIACGV(3), DIDCGV(3), EMISAG(3), EMISDG(3), LAMDAV, LHREV01051100
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ISN 0121          COMMON   LV, MCPGAV, MCPGDV, MOTGRV, NCARV, NOPTV(3), NECARV      01051200
ISN 0122          COMMON   PER4V(3), REGENV(3)                                      01051300
ISN 0123          COMMON   RE1M(3), RE2M(3), RE3M(3), RRACC(3), SHREV(3), SLOPEV(3) 01051400
ISN 0124          COMMON   SP1(3), SP2(3), SRE1M(3), SRE2M(3), TESP1(3)             01051500
ISN 0125          COMMON   TIACCV(3), TIDECV(3), UCHPRV(3), U2M(3), U3M(3), WV(3)   01051600
            C   UNDERPLATFORM EXHAUST VARIABLES                                    01051700
ISN 0126          COMMON   EESUX, EEMUX, OPTUX, UMAXUX                              01051800
            C  ROUTE VARIABLES  ( LMTRRT )                                         01051900
ISN 0127          COMMON   CDPTRT, NTSRT, ORIGRT(6), UMINRT(6)                      01052000
            C    DISPATCHER VARIABLES  ( LMTRRT ) AND ( LMTRGP X LMTRRT )          01052100
ISN 0128          COMMON   GRHDWY, GRTYPV, JGROUP, NGRV, NMTRGR, NTINTR(6)          01052200
ISN 0129          COMMON   NTRGR, NUMBTR                                            01052300
            C    TRACK SECTION VARIABLES  ( LMTSRT X LMTRRT )                      01052400
ISN 0130          COMMON   DWLTS, ESTS(260,6), GRDTS(260,6), NPETTS                 01052500
ISN 0131          COMMON   NSEGTS, RADTS(260,6), UMXTS(260,6)                       01052600
            C    EXPLICIT TRAIN PERFORMANCE VARIABLES  ( LMEXPD X LMTRRT )         01052700
ISN 0132          COMMON   NEXPDP, QGRIDV(201,6), SPEEDV(201,6), TIMEV              01052800
            C  OPERATIONAL TRAIN VARIABLES  ( LMTRAN )                             01052900
ISN 0133          COMMON   AMPV(30), AMPLV(30), ANVV(30), DGRDQV(30), DPV, DRAGV(30)01053000
ISN 0134          COMMON   DUDTV(30), INDEX, IROTEV, ITYPV, MODEV, NTSV             01053100
ISN 0135          COMMON   NTSV2, QACCV(30), QDECV(30), QERACV(30), QERDCV(30)      01053200
ISN 0136          COMMON   QTRPE(30), RGSUMV(30), RMHTV(30), RSISTV(30), TAAVGV(30) 01053300
ISN 0137          COMMON   TEV(30), TGACCV(30), TGDECV(30), TLPSV, TNUMV, TSTRTV    01053400
ISN 0138          COMMON   TWAVGV(30), UV(30), WPATV(30), XLASTV(30), XV(30)        01053500
            C  FAN TYPE VARIABLES  ( LMFNTP )                                      01053600
ISN 0139          COMMON   CFMHFT(4), CFMLFT(4), FN1IFT(4), FN2IFT(4), FN3IFT(4)    01053700
ISN 0140          COMMON   FN4IFT(4), FN1OFT(4), FN2OFT(4), FN3OFT(4), FN4OFT(4)    01053800
ISN 0141          COMMON   TIMFT(4)                                                 01053900
            C  UNSTEADY HEAT LOAD VARIABLES  ( LMUL )                              01054000
ISN 0142          COMMON   HLLUL(10), HLSUL(10), LSSUL, LTONUL(10), LTOFUL(10)      01054100
            C  PATRON CHARACTERISTICS                                              01054200
ISN 0143          COMMON   PATWHT                                                   01054300
            C  PRINT GROUP VARIABLES  ( LMPRGP )                                   01054400
ISN 0144          COMMON   GINTPR, GRABBP, GRSUM, NPRGR                             01054500
            C                                                                      01054600
ISN 0145          EQUIVALENCE  (ND(1), NDS(2), NDSS(3))                             01054700
            C                                                                      01054800
            C                                                                      01054900
            C                                                                      01055000
            C                                                                      01055100
ISN 0146          DATA MONTHS /  4HJANU,4HARY ,4HFEBR,4HUARY,4HMARC,4HH    ,       01055200
                1 4HAPRI,4HL    ,4HMAY ,4H     ,4HJUNE,4H     ,4HJULY,4H     ,       01055300
                2 4HAUGU,4HST   ,4HSEPT,4H.    ,4HOCTO,4HBER ,4HNOVE,4HMBER,         01055400
                3 4HDECE,4HMBER /                                                  01055500
ISN 0147     10   FORMAT (1H1,8A1,8X,'SES',10X,17A4,A2,9X,'PAGE',/,115X,'------')  01055600
ISN 0148     20   FORMAT (17A4,A2)                                                 01055700
ISN 0149     30   FORMAT (8F10.2)                                                  01055800
ISN 0150     40   FORMAT (9A4,4X,4F10.2)                                           01055900
ISN 0151     50   FORMAT (1H1,4(/),T45,'TRANSIT DEVELOPMENT CORPORATION',5(/),T49,5(01056000
                1'X'),3X,7('X'),3X,5('X')/T48,'X',T57,'X',T66,'X'/T49,5('X'),T57,5(01056100
                2'X'),T67,5('X')/T54,'X',T57,'X',T72,'X'/T54,'X',T57,'X',T72,'X'/T401056200
                38,6('X'),T57,7('X'),T66,6('X')///T46,'SUBWAY ENVIRONMENT SIMULATIO01056300
                4N',6(/))                                                          01056400
ISN 0152     60   FORMAT (1H ,T52,'SIMULATION OF',////,25X,17A4,A2////25X,17A4,A2///01056500
                1/)                                                                01056600
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ISN 0153    70    FORMAT (25X,17A4,A2,////)                                    01056700
ISN 0154    80    FORMAT (1H ,36X,'DESIGN TIME',I5,' HRS',3X,2A4,I6,///)       01056800
ISN 0155    90    FORMAT (1H ,38X,'DESIGN TIME 0',I3,' HRS',3X,2A4,I6,/)       01056900
ISN 0156   100    FORMAT (1H ,56X,8A1,//T95,'PREPARED BY -'//,T97,'PARSONS, BRINCKER01057000
                 1HOFF,',/,T97,'QUADE AND DOUGLAS, INC.',/,T97,'NEW YORK, NEW YORK',01057100
                 2/,T97,'VERSION 2.04')                                       01057200 ← C
ISN 0157   110    FORMAT (1H0,T45,'INPUT VERIFICATION OF GENERAL DATA')        01057300
ISN 0158   120    FORMAT (1H0,T113,'FORM 1C'/T30,'TRAIN PERFORMANCE OPTION',T80,I5,T01057400
                 190,'BYPASS')                                                01057500
ISN 0159   130    FORMAT (1H0,T113,'FORM 1C'/T30,'TRAIN PERFORMANCE OPTION',T80,I5,T01057600
                 190,'IMPLICIT')                                              01057700
ISN 0160   140    FORMAT (1H0,T113,'FORM 1C'/T30,'TRAIN PERFORMANCE OPTION',T80,I5,T01057800
                 190,'EXPLICIT (HEAT REJ. COMPUTED)')                         01057900
ISN 0161   150    FORMAT (1H0,T113,'FORM 1C'/T30,'TRAIN PERFORMANCE OPTION',T80,I5,T01058000
                 190,'EXPLICIT (HEAT REJ. INPUT)')                            01058100
ISN 0162   160    FORMAT (1H0,T30,'TEMPERATURE / HUMIDITY SIMULATION OPTION',T80,I5,01058200
                 1T90,'BYPASS')                                               01058300
ISN 0163   170    FORMAT (1H0,T30,'TEMPERATURE / HUMIDITY SIMULATION OPTION',T80,I5,01058400
                 1T90,'YES')                                                  01058500
ISN 0164   180    FORMAT (1H0,T30,'TEMPERATURE / HUMIDITY SIMULATION OPTION',T80,I5,01058600
                 1T90,'YES - EVAPORATION')                                    01058700
ISN 0165   190    FORMAT (1H0,T30,'HUMIDITY DISPLAY OPTION',T80,I5,T90,'HUMIDITY RAT01058800
                 1IO')                                                        01058900
ISN 0166   200    FORMAT (1H0,T30,'HUMIDITY DISPLAY OPTION',T80,I5,T90,'WET-BULB TEM01059000
                 1PERATURE')                                                  01059100
ISN 0167   210    FORMAT (1H0,T30,'HUMIDITY DISPLAY OPTION',T80,I5,T90,'RELATIVE HUM01059200
                 1IDITY')                                                     01059300
ISN 0168   220    FORMAT (1H0,T30,'ENVIRONMENTAL CONTROL LOAD EVALUATION OPTION',T8001059400
                 1,I5,T90,'BYPASS')                                           01059500
ISN 0169   230    FORMAT (1H0,T30,'ENVIRONMENTAL CONTROL LOAD EVALUATION OPTION',T80C1059600
                 1,I5,T90,'YES')                                              01059700
ISN 0170   240    FORMAT (1H0,T30,'ENVIRONMENTAL CONTROL LOAD EVALUATION OPTION',T80C1059800
                 1,I5,T90,'OFF-HOUR')                                         01059900
ISN 0171   250    FORMAT (1H0,T30,'HEAT SINK SUMMARY PRINT OPTION',T80,I5,T90,'BYPAS01060000
                 1S')                                                         01060100
ISN 0172   260    FORMAT (1H0,T30,'HEAT SINK SUMMARY PRINT OPTION',T80,I5,T90,'YES')01060200
ISN 0173   270    FORMAT (1H0,T30,'SUPPLEMENTARY OUTPUT OPTION',T80,I5)        01060300
ISN 0174   280    FORMAT (1H0,T30,'ALLOWABLE SIMULATION ERRORS',T80,I5)        01060400
ISN 0175   290    FORMAT (1H0,T30,'ALLOWABLE INPUT ERRORS',T80,I5)             01060500
ISN 0176   300    FORMAT (1H0,T30,'ALLOWABLE INPUT ERRORS',T80,I5,T90,'NO SIMULATION01060600
                 1')                                                          01060700
ISN 0177   310    FORMAT (/1H0,T30,'NUMBER OF LINE SEGMENTS',T80,I5,T113,'FORM 1D') 01060800
ISN 0178   320    FORMAT (1H0,T30,'TOTAL NUMBER OF SECTIONS',T80,I5)           01060900
ISN 0179   330    FORMAT (1H0,T30,'NUMBER OF VENTILATION SHAFT SECTIONS',T80,I5)  01061000
ISN 0180   340    FORMAT (1H0,T30,'NUMBER OF NODES',T80,I5)                    01061100
ISN 0181   350    FORMAT (1H0,T30,'NUMBER OF BRANCHED JUNCTIONS',T80,I5)       01061200
ISN 0182   360    FORMAT (1H0,T30,'NUMBER OF PORTALS',T80,I5)                  01061300
ISN 0183   370    FORMAT (1H0,T30,'NUMBER OF UNSTEADY HEAT SOURCES',T80,I5)    01061400
ISN 0184   380    FORMAT (1H0,T30,'NUMBER OF FAN TYPES',T80,I5)                01061500
ISN 0185   390    FORMAT (1H0,T30,'NUMBER OF TRAIN ROUTES',T80,I5,T113,'FORM 1E')  01061600
ISN 0186   400    FORMAT (1H0,T30,'NUMBER OF TRAIN TYPES',T80,I5)              01061700
ISN 0187   410    FORMAT (1H0,T30,'NUMBER OF ENVIRONMENTAL CONTROL ZONES',T80,I5)  01061800
ISN 0188   420    FORMAT (1H0,T30,'FAN STOPPING/WINDMILLING OPTION',T80,I5)    01061900
ISN 0189   430    FORMAT (1H+,T90,'MEANINGLESS')                               01062000
ISN 0190   440    FORMAT (1H+,T90,'SIMULATION TERMINATION')                    01062100
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No changes in remaining portion of subroutine INPUT.

November 18, 1976

SUBWAY ENVIRONMENT SIMULATION (SES) COMPUTER PROGRAM

REVISION NO. 5 TO VERSION 2

Problem

Items to be printed as part of the optional supplementary output did not print correctly.

Symptoms

The use of supplementary output option number one should cause the output of additional items in the Environmental Control System Load Estimates. Among these items should be the directional components of the sensible and latent convective loads for each subsegment. The program has been printing asterisks for these items.

Correction

See the attached partial listing of Subroutine ACEST2. The three lines to be corrected are indicated by a "C."

Effect on Previous Results

This problem did not affect the calculation or output of any other items.

```
        COMPILER OPTIONS - NAME=  MAIN,OPT=02,LINECNT=57,SIZE=0000K,
                           SOURCE,EBCDIC,NOLIST,NODECK,LOAD,MAP,NOEDIT,ID,NOXREF
 ISN 0002           SUBROUTINE ACEST2 (TAIR,HRATIO,DTDXLS,DTHXLS,DTWXLS,NBRNCH)
                C
                C     THIS SUBROUTINE COMPUTES AN AIR CONDITIONING LOAD ESTIMATE
                C     FOR EACH SUBSEGMENT LOCATED IN A TEMPERATURE CONTROLLED ZONE
                C
                C DTDXLS(ISEG) IS THE DESIGN DRY BULB TEMPERATURE IN DEG F FOR A
                C        CONTROLLED ZONE. IT IS STORED FOR EACH LINE SEGMENT ISEG
                C        IN THE ZONE.
                C
                C DTHXLS(ISEG) IS THE DESIGN SPECIFIC HUMIDITY IN DEG F FOR A
                C        CONTROLLED ZONE. IT IS STORED FOR EACH LINE SEGMENT ISEG
                C        IN THE ZONE.
                C
                C DTWXLS(ISEG) IS THE DESIGN WET BULB TEMPERATURE IN DEG F FOR A
                C        CONTROLLED ZONE. IT IS STORED FOR EACH LINE SEGMENT ISEG
                C        IN THE ZONE.
                C
                C HRATIO(IZZ) HAS TWO MEANINGS
                C        1) FOR VALUES OF IZZ FROM 1 TO TNSS, HRATIO(IZZ) IS THE AVERAGE
                C           SUBSEGMENT AIR SPECIFIC HUMIDITY RATIO FOR SUBSEGEMNT IZZ
                C           THAT HAS BEEN COMPUTED BY THE 'DTRH' AS PART OF THE HEAT
                C           SINK - AIR CONDITIONING ITERATION. IT IS USED ONLY FOR
                C           SUBSEGMENTS IN UNCONTROLLED ZONES SINCE THE SUBSEGMENTS IN
                C           CONTROLLED ZONES ARE ASSUMED TO HAVE AVERAGE SPECIFIC
                C           HUMIDITY RATIOS EQUAL TO DESIGN.
                C        2) FOR VALUES OF IZZ FROM TNSS+1 TO TNSS+NTNODE, HRATIO(IZZ) IS
                C           THE AVERAGE MOISTURE LEAVING THERMODYNAMIC NODE IZZ-TNSS (OR
                C           NODE+TNSS) IN (FT**3)/SEC THAT HAS BEEN COMPUTED BY THE
                C           'DTRH' AS PART OF THE HEAT SINK - AIR CONDITIONING ITERATION
                C           IT IS ONLY USED FOR NODES IN UNCONTROLLED ZONES SINCE ALL
                C           OTHER NODES ARE AT DESIGN SPECIFIC HUMIDITY (THOSE INTERIOR
                C           TO ZONES) OR ARE AT BOUNDARY SPECIFIC HUMIDITIES.
                C
                C TAIR(IZZ) HAS TWO MEANINGS
                C        1) FOR VALUES OF IZZ FROM 1 TO TNSS, TAIR(IZZ) IS THE AVERAGE
                C           SUBSEGMENT AIR TEMPERATURE FOR SUBSEGEMNT IZZ IN DEG F THAT
                C           HAS BEEN COMPUTED BY THE 'DTRM' AS PART OF THE HEAT SINK
                C           - AIR CONDITIONING ITERATION. IT IS USED ONLY FOR
                C           SUBSEGMENTS IN UNCONTROLLED ZONES SINCE THE SUBSEGMENTS IN
                C           CONTROLLED ZONES ARE ASSUMED TO HAVE AVERAGE TEMPERATURES
                C           EQUAL TO DESIGN.
                C        2) FOR VALUES OF IZZ FROM TNSS+1 TO TNSS+NTNODE, TAIR(IZZ) IS
                C           THE AVERAGE ENERGY LEAVING THERMODYNAMIC NODE IZZ-TNSS (OR
                C           NODE+TNSS) IN (FT**3)*(DEG F)/SEC THAT HAS BEEN COMPUTED BY
                C           THE 'DTRM' AS PART OF THE HEAT SINK - AIR CONDITIONING
                C           ITERATION. IT IS ONLY USED FOR NODES IN UNCONTROLLED ZONES
                C           SINCE ALL OTHER NODES ARE AT DESIGN TEMPERATURE (THOSE
                C           INTERIOR TO ZONES) OR ARE AT BOUNDARY TEMPERATURES.
                C
                C     INCLUDE  DSHARE
                C
                C ************************ INTEGER VARIABLES ************************ C
                C
```

```
                C  GENERAL VARIABLES                                                    00005400
ISN 0003            INTEGER   AETIME, BLANK, BLPREQ, DATE(8), DEATH, DESPER, FSCFT      00005500
ISN 0004            INTEGER   HCOPT, HSOPT, HUMOPT, OUT, PRTIME, SLASH, SUPOPT          00005600
ISN 0005            INTEGER   SYSTEM(18), THOPT, THTIME, TNLSS, TNSS, TPOPT, TRTIME     00005700
                C  SECTION VARIABLES  (LMSECT)                                          00005800
ISN 0006            INTEGER   NTOPS(140)                                                00005900
ISN 0007            INTEGER   TABL9(140), TABL10(140), TABL11(140), TABL12(140)          00006000
ISN 0008            INTEGER   TABL13(140), TABL20(140), TABL21(140)                     00006100
                C    SECTION (LMSECT), SECTION+ONE  (LMSECT+1) ,  SECTION+TWO (LMSECT+2)00006200
ISN 0009            INTEGER   ND(140), NDS(141), NDSS(142)                              00006300
                C    SECTION * ESTIMATED AVERAGE OF 3 LOOPS THROUGH SECTION ( LMLPK )   00006400
ISN 0010            INTEGER   LKAN(420)                                                 00006500
                C    SECTION EXTERNAL IDENTIFICATION NUMBERS (LMSCTX)                   00006600
ISN 0011            INTEGER   TABL14(400)                                               00006700
                C  NODE VARIABLES  (LMNODE)                                             00006800
ISN 0012            INTEGER   TABL1(132), TABL15(130), TABL16(130), TABL22(130)         00006900
ISN 0013            INTEGER   TABL23(132), TABL45(130), TYPTND(130)                     00007000
                C  AERODYNAMIC NODE VARIABLES (LMTBL2)                                  00007100
ISN 0014            INTEGER   TABL2(1500)                                               00007200
                C    NODES BY NUMBER OF SECTIONS CONNECTED TO NODE (LMNODE X LMSCND)    00007300
ISN 0015            INTEGER   TABL17(130,5), TABL18(130,5)                              00007400
                C    NODE EXTERNAL IDENTIFICATION NUMBERS (LMSCTX)                      00007500
ISN 0016            INTEGER   TABL19(400)                                               00007600
                C  LOOP VARIABLES  (LMNLOP)                                             00007700
                C  LINE SEGMENT VARIABLES  (LMLSEG)                                     00007800
ISN 0017            INTEGER   NTRNLS(90), NUMLS(90), TABL3(90), TABL4(90), TABL8(90)    00007900
ISN 0018            INTEGER   TYPLS(90)                                                 00008000
                C    LINE SEGMENT BY NUMBER OF TRAINS IN SEGMENT  (LMLSEG X LMTRSG)     00008100
ISN 0019            INTEGER   TRNNLS(90,8)                                              00008200
                C  VENTILATION SHAFT SEGMENT VARIABLES    ( LMVSEG )                    00008300
ISN 0020            INTEGER   FTOFVS(60), FTONVS(60), NUMVS(60)                         00008400
ISN 0021            INTEGER   TABL6(60), TYPVS(60), EXVOVS(60), FTYPVS(60), TABL5(60)   00008500
                C  SUBSEGMENT VARIABLES  (LMSS)                                         00008600
ISN 0022            INTEGER   TABL7(300), TABL44(300)                                   00008700
                C  LINE SUBSEGMENT VARIABLES   ( LMLSS X TABLE SIZE )                   00008800
ISN 0023            INTEGER   EXDTDB(250,6)                                             00008900
                C    LINE SUBSEGMENT BY TRAIN ROUTE ( LMLSS X LMTRRT )                  00009000
ISN 0024            INTEGER   ITNLSS(250,6)                                             00009100
                C  HEATING OR COOLING ZONE CLUSTER VARIABLES  (LMCLST)                  00009200
ISN 0025            INTEGER   TYPCL(30)                                                 00009300
                C  SUBWAY VEHICLE TYPE VARIABLES  (LMTRTP)                              00009400
ISN 0026            INTEGER   NCARV(3), NPCARV(3)                                       00009500
                C  UNDERPLATFORM EXHAUST VARIABLES                                      00009600
ISN 0027            INTEGER   OPTUX                                                     00009700
                C  ROUTE VARIABLES  (LMTRRT)                                            00009800
ISN 0028            INTEGER   COPTRT(6), NTSRT(6)                                       00009900
                C    DISPATCHER VARIABLES (LMTRRT) AND (LMTRGP X LMTRRT)                00010000
ISN 0029            INTEGER   GRTYPV(15,6), JGROUP(6), NGRV(6), NMTRGR(6)               00010100
ISN 0030            INTEGER   NTRGR(15,6)                                               00010200
ISN 0031            INTEGER   GRHOWY(15,6)                                              00010300
                C    TRACK SECTION VARIABLES  (LMTSRT X LMTRRT)                         00010400
ISN 0032            INTEGER   DWLTS(260,6)                                              00010500
ISN 0033            INTEGER   NPETTS(260,6), NSEGTS(260,6)                              00010600
                C    EXPLICIT TRAIN PERFORMANCE VARIABLES  (LMEXPD X LMTRRT)            00010700
ISN 0034            INTEGER   NEXPDP(6)                                                 00010800
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ISN 0035          INTEGER   TIMEV(201,6)                                    00010900
            C  OPERATIONAL TRAIN VARIABLES  (LMTRAN)                        00011000
ISN 0036          INTEGER   DPV(30), INDEX(30), IROTEV(30), ITYPV(30), MODEV(30)  00011100
ISN 0037          INTEGER   NTSV(30), NTSV2(30), TNUMV(30)                  00011200
ISN 0038          INTEGER   TLPSV(30), TSTRTV(30)                           00011300
            C  FAN TYPE VARIABLES  (LMFNTP)                                 00011400
            C  UNSTEADY HEAT LOAD VARIABLES  ( LMUL )                       00011500
ISN 0039          INTEGER   LSSUL(10)                                       00011600
            C  PRINT GROUP VARIABLES  ( LMPRGP )                            00011700
ISN 0040          INTEGER   GINTPR(15), GRABBP(15), GRSUM(15), NPRGR(15)    00011800
            C                                                               00011900
            C ************************** REAL VARIABLES ************************** C00012000
            C                                                               00012100
            C  GENERAL VARIABLES                                            00012200
ISN 0041          REAL      NUAIR, MPHFPS                                 00012300
            C  SECTION VARIABLES                                            00012400
            C  NODE VARIABLES                                               00012500
            C  LOOP VARIABLES                                               00012600
            C  LINE SEGMENT VARIABLES                                       00012700
ISN 0042          REAL      LLS(90), LLSS(90)                             00012800
            C  VENTILATION SHAFT SEGMENT VARIABLES                          00012900
ISN 0043          REAL      LVS(60), LVSS(60)                             00013000
            C  SUBSEGMENT VARIABLES                                         00013100
ISN 0044          REAL      LHLTSS(300), LSUMSS(300)                      00013200
            C  LINE SUBSEGMENT VARIABLES                                    00013300
ISN 0045          REAL      LACLSS(250), LHLSS(250)                       00013400
            C  ZONE VARIABLES                                               00013500
            C  SUBWAY VEHICLE TYPE VARIABLES                                00013600
ISN 0046          REAL      LAMDAV(3), LHREV(3), LV(3), MCPGAV(3), MCPGDV(3)  00013700
ISN 0047          REAL      MOTORV(3)                                     00013800
            C  ROUTE VARIABLES                                              00013900
            C    DISPATCHER VARIABLES                                       00014000
            C    TRACK SECTION VARIABLES                                    00014100
            C    EXPLICIT TRAIN PERFORMANCE VARIABLES                       00014200
            C  OPERATIONAL TRAIN VARIABLES                                  00014300
            C  FAN TYPE VARIABLES                                           00014400
            C  PRINT GROUP VARIABLES                                        00014500
            C                                                               00014600
            C ****************************** COMMON ****************************** C00014700
            C                                                               00014800
            C GENERAL VARIABLES                                             00014900
ISN 0048          COMMON    AETIME, ANNAMP, BLANK, BLPREQ, DATE, DEATH      00015000
ISN 0049          COMMON    DELAE, DELP, DELT, DELTH, DELTR, DEL2TH, DESPER, FSCFT  00015100
ISN 0050          COMMON    HCOPT, HMAMBE, HMAMBM, HOUR, HSOPT, HUMAMB, HUMOPT  00015200
ISN 0051          COMMON    IEQUAT, IN, INODE, IPRGRP, ISITU, JRATAE, JRATTH, JRATTR 00015300
ISN 0052          COMMON    KAERO, KASTEP, KBND1, KBND2, KBND3, KPRNTH, KTSTEP, LIFE 00015400
ISN 0053          COMMON    LINES, MAXTIM, MONTH, MXMNPT, NBR, NBRJCT, NCLUST, NDELT 00015500
ISN 0054          COMMON    NDTYPA, NEW, NFNTYP, NLOOP, NLS, NLSCP1, NLSEC, NNODE  00015600
ISN 0055          COMMON    NOSUMY, NOSYS, NOTRAN, NPGRP, NPORTL, NSEC, NSIMER  00015700
ISN 0056          COMMON    NTIME, NTNODE, NTRAN, NTRRTE, NTRTYP, NUMUL, NVSEC  00015800
ISN 0057          COMMON    NZONE, OUT, PAMB, PRTIME, SLASH                 00015900
ISN 0058          COMMON    SUMTST, SUPOPT, SYSTEM, TAMBA, TAMBM, TDBAMB    00016000
ISN 0059          COMMON    THOPT, THTIME, TNLSS, TNSS, TPOPT, TRTIME, TWBAMB, TWAMBE00016100
ISN 0060          COMMON    TWAMBM, WNTSUM                                  00016200
            C  ARRAY SIZE LIMITS                                            00016300
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ISN 0061          COMMON   LMBLP,LMCLST,LMCOND,LMEQRM, LMEXPD, LMFNTP, LMLPK, LMLPLK00016400
ISN 0062          COMMON   LMLSEG, LMLSS, LMNLOP, LMNODE, LMNODX, LMPRGP, LMSCND    00016500
ISN 0063          COMMON   LMSCTX, LMSECT, LMSS, LMSSTN, LMTBL2, LMTHND, LMTRAN     00016600
ISN 0064          COMMON   LMTRGP, LMTRRT, LMTRSG, LMTRTP, LMTSRT, LMUL, LMVSEG     00016700
            C  PHYSICAL CONSTANTS                                                   00016800
ISN 0065          COMMON   ABTEMP, BTUFLB, CP, FLBBTU, FLBHP, FPSMPH, FTIN, GRACC   00016900
ISN 0066          COMMON   HVH2O, MPHFPS, NUAIR, PI, PR, RDRYAR, RHOCP, RHOMAS      00017000
ISN 0067          COMMON   RHOWHT, SAINHG, SAPSI, STEFAN, THCON, TONLB, VISAIR      00017100
ISN 0068          COMMON   WGCONS, WTBTUS                                           00017200
            C  SECTION VARIABLES  ( LMSECT )                                        00017300
ISN 0069          COMMON   AHIGHS(140), ALOWS(140), BCS(140), BS(140), CEPS(140)    00017400
ISN 0070          COMMON   CENS(140), DQDTS(140), MNQS(140), MXQS(140), NTQPS       00017500
ISN 0071          COMMON   OMEGS(140), QS(140), QSAVES(140), QSMX(140), QSMN(140)   00017600
ISN 0072          COMMON   SUMQNS(140), SUMQPS(140), TABL9, TABL10, TABL11, TABL12  00017700
ISN 0073          COMMON   TABL13, TABL20, TABL21, VHIGHS(140), VLOWS(140)          00017800
            C    SECTION + TWO  (LMSECT+2)                                          00017900
ISN 0074          COMMON   NDSS                                                     00018000
            C    SECTION * ESTIMATED AVERAGE OF 3 LOOPS THROUGH SECTION ( LMLPLK )  00018100
ISN 0075          COMMON   LKAN                                                     00018200
            C    SECTION EXTERNAL IDENTIFICATION NUMBERS                            00018300
ISN 0076          COMMON   TABL14                                                   00018400
            C  NODE VARIABLES  ( LMNODE )                                           00018500
ISN 0077          COMMON   TABL1, TABL15, TABL16, TABL17, TABL18, TABL22, TABL23    00018600
ISN 0078          COMMON   TABL45, TYPTND                                           00018700
            C    NODE EXTERNAL IDENTIFICATION NUMBERS                               00018800
ISN 0079          COMMON   TABL19                                                   00018900
            C  AERODYNAMIC NODE VARIABLES  (LMTBL2)                                 00019000
ISN 0080          COMMON   TABL2                                                    00019100
            C  AERODYNAMIC JUNCTION COEFFICIENTS ( LMCOND )                         00019200
ISN 0081          COMMON   COAEND(950)                                              00019300
            C  THERMODYNAMIC NODE VARIABLES  ( LMTHND ).                            00019400
ISN 0082          COMMON   HAVGTN(140), HUMTN(140), TAVGTN(140), TDBTN(140)         00019500
            C    THERMODYNAMIC NODES BY NUMBER OF SECTIONS CONNECTED TO A NODE      00019600
            C    ( LMTHND X LMSCND )                                                00019700
ISN 0083          COMMON   EMHBTN(140,5), EMTBTN(140,5), FLOBTN(140,5)              00019800
            C  LOOP VARIABLES  ( LMNLOP )                                           00019900
ISN 0084          COMMON   DQDTLP(75), OMEGLP(75), QERRLP(75), QLP(75)              00020000
            C  AERODYNAMIC MATRIX OF COEFFICIENTS - ARRAY SIZE ESTIMATED AT         00020100
            C  APPROXIMENTLY 0.05*LMSECT**2  (LMBLP)                                00020200
ISN 0085          COMMON   BLP(1000)                                                00020300
            C  LINE SEGMENT VARIABLES  ( LMLSEG )                                   00020400
ISN 0086          COMMON   ALS(90), CILS(90), CBNLS(90), CBPLS(90), CFNLS(90)       00020500
ISN 0087          COMMON   CFPLS(90), DBTLS(90), DTDELS(90), DTDMLS(90), DTHELS(90) 00020600
ISN 0088          COMMON   DTHMLS(90), DTWELS(90), DTWMLS(90), EPSLS(90), FEFLS(90) 00020700
ISN 0089          COMMON   FLS(90), LLS, LLSS, NAMLS(90,9), NTRNLS, NUMLS           00020800
ISN 0090          COMMON   PDRYLS(90), PERMLS(90), RELS(90), RNFLS(90), RPRMLS(90)  00020900
ISN 0091          COMMON   SURLSS(90), TABL3, TABL4, TABL8, THCNLS(2,90)            00021000
ISN 0092          COMMON   THDFLS(2,90), TSNKLS(90), TYPLS, VOLLSS(90)              00021100
            C    LINE SEGMENT BY NUMBER OF TRAINS IN LINE SEGMENT (LMLSEG X LMTRSG) 00021200
ISN 0093          COMMON   TRNNLS                                                   00021300
            C    LINE SEGMENT BY TWICE THE NUMBER OF TRAINS IN A LINE SEGMENT       00021400
            C    (LMLSEG X 2*LMTRSG)                                                00021500
ISN 0094          COMMON   TRNDLS(90,16)                                            00021600
            C  VENTILATION SHAFT SEGMENT VARIABLES  ( LMVSEG )                      00021700
ISN 0095          COMMON   AGVS(60), AVS(60), EXVOVS, FDIRVS(60), FPMXVS(60)        00021800
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ISN 0096          COMMON   FPMNVS(60), FTOFVS, FTONVS, FTYPVS, LVS, LVSS                00021900
ISN 0097          COMMON   NAMVS(60,9), MNFPVS(60), MXFPVS(60), NUMVS, REVS(60)        00022000
ISN 0098          COMMON   RNFVS(60), STAKVS(60), SURVSS(60), TABL5, TABL6, TYPVS      00022100
ISN 0099          COMMON   VOLVSS(60), VOMXVS(60)                                      00022200
            C  SUBSEGMENT VARIABLES (LINE AND VENT SHAFT SUBSEGMENT)  (LMSS)           00022300
ISN 0100          COMMON   DERHSS(300), DERTSS(300), EMTBSS(300), EMTFSS(300)          00022400
ISN 0101          COMMON   EMHBSS(300), EMHFSS(300), FBSS(300), FFSS(300)              00022500
ISN 0102          COMMON   FLOBSS(300), FLOFSS(300), HRMN(300), HRMX(300)              00022600
ISN 0103          COMMON   HSUMSS(300), HTRNSS(300), HTMPSS(300), HTSMSS(300)          00022700
ISN 0104          COMMON   HUMSS(300), LHLTSS, LSUMSS, MNHR(300), MNTDB(300)           00022800
ISN 0105          COMMON   MNTWB(300), MXHR(300), MXTDB(300), MXTWB(300)               00022900
ISN 0106          COMMON   QERHSS(300), QERTSS(300), QSMXSS(300), QSUMSS(300)          00023000
ISN 0107          COMMON   SHLTSS(300), SHRSS(300), SHUXSS(300), STDBSS(300)           00023100
ISN 0108          COMMON   STDNSS(300), STDPSS(300), STWBSS(300), TABL7, TDBSS(300)    00023200
ISN 0109          COMMON   TDBMN(300), TDBMX(300), TSFSS(300), TABL44, TTMPSS(300)     00023300
ISN 0110          COMMON   TWBSS(300), TWBMN(300), TWBMX(300), VOLSS(300)              00023400
            C  LINE SUBSEGMENT VARIABLES  (LMLSS)                                      00023500
ISN 0111          COMMON   EXDTDB, LACLSS, LHLSS, SACLSS(250), SHLSS(250)              00023600
            C    LINE SUBSEGMENT BY TRAIN ROUTE  (LMLSS X LMTRRT)                      00023700
ISN 0112          COMMON   ITNLSS                                                      00023800
            C  ZONE CLUSTER VARIABLES                                                  00023900
ISN 0113          COMMON   TYPCL                                                       00024000
            C  SUBWAY VEHICLE TYPE VARIABLES  ( LMTRTP )                               00024100
ISN 0114          COMMON   ACACCV(3), ACCV(3), ACDECV(3), ARACCV(3), ARDECV(3)         00024200
ISN 0115          COMMON   AV(3), CDBVOV(3), CDFVOV(3), CHPR1V(3), CHPR2V(3)           00024300
ISN 0116          COMMON   COAMP(3,4), COAMPL(3,6), COATEV(3), COBTEV(3), CORMV(3,3)00024400
ISN 0117          COMMON   COTEV(3,4), DECAV(3), DECBV(3), DECV(3), DECV1V(3)          00024500
ISN 0118          COMMON   DIACGV(3), DIDCGV(3), EMISAG(3), EMISDG(3), LAMDAV, LHREV00024600
ISN 0119          COMMON   LV, MCPGAV, MCPGDV, MOTORV, NCARV, NOPTV(3), NPCARV         00024700
ISN 0120          COMMON   PERMV(3), REGENV(3)                                         00024800
ISN 0121          COMMON   RE1M(3), RE2M(3), RE3M(3), RRACC(3), SHREV(3), SLOPEV(3) 00024900
ISN 0122          COMMON   SP1(3), SP2(3), SRE1M(3), SRE2M(3), TESP1(3)                00025000
ISN 0123          COMMON   TIACCV(3), TIDECV(3), UCHPRV(3), U2M(3), U3M(3), WV(3)      00025100
            C   UNDERPLATFORM EXHAUST VARIABLES                                        00025200
ISN 0124          COMMON   EFSUX, EFMUX, OPTUX, UMAXUX                                 00025300
            C  ROUTE VARIABLES  ( LMTRRT )                                             00025400
ISN 0125          COMMON   COPTRT, NTSRT, ORIGRT(6), UMINRT(6)                         00025500
            C    DISPATCHER VARIABLES  ( LMTRRT ) AND ( LMTRGP X LMTRRT )              00025600
ISN 0126          COMMON   GRHDWY, GRTYPV, JGROUP, NGRV, NMTRGR, NTIMTR(6)             00025700
ISN 0127          COMMON   NTRGR, NUMBTR                                               00025800
            C    TRACK SECTION VARIABLES  ( LMTSRT X LMTRRT )                          00025900
ISN 0128          COMMON   DWLTS, FSTS(260,6), GRDTS(260,6), NPETTS                    00026000
ISN 0129          COMMON   NSEGTS, RADTS(260,6), UMXTS(260,6)                          00026100
            C    EXPLICIT TRAIN PERFORMANCE VARIABLES  ( LMEXPD X LMTRRT )             00026200
ISN 0130          COMMON   NEXPDP, QGRIDV(201,6), SPEEDV(201,6), TIMEV                 00026300
            C  OPERATIONAL TRAIN VARIABLES  ( LMTRAN )                                 00026400
ISN 0131          COMMON   AMPV(30), AMPLV(30), ANVV(30), DGRDQV(30), DPV, DRAGV(30)00026500
ISN 0132          COMMON   DUDTV(30), INDEX, IROTEV, ITYPV, MODEV, NTSV                00026600
ISN 0133          COMMON   NTSV2, QACCV(30), QDECV(30), QERACV(30), QERDCV(30)         00026700
ISN 0134          COMMON   QTRPF(30), RGSUMV(30), RMHTV(30), RSISTV(30), TAAVGV(30) 00026800
ISN 0135          COMMON   TEV(30), TGACCV(30), TGDECV(30), TLPSV, TNUMV, TSTRTV       00026900
ISN 0136          COMMON   TWAVGV(30), UV(30), WPATV(30), XLASTV(30), XV(30)           00027000
            C  FAN TYPE VARIABLES  ( LMFNTP )                                          00027100
ISN 0137          COMMON   CFMHFT(4), CFMLFT(4), FN1IFT(4), FN2IFT(4), FN3IFT(4)       00027200
ISN 0138          COMMON   FN4IFT(4), FN1OFT(4), FN2OFT(4), FN3OFT(4), FN4OFT(4)       00027300
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ISN 0139          COMMON   TIMFT(4)                                          00027400
            C  UNSTEADY HEAT LOAD VARIABLES  ( LMUL )                        00027500
ISN 0140          COMMON   HLLUL(10), HLSUL(10), LSSUL, LTCNUL(10), LTOFUL(10)  00027600
            C  PATRON CHARACTERISTICS                                        00027700
ISN 0141          COMMON   PATWHT                                            00027800
            C  PRINT GROUP VARIABLES  ( LMPRGP )                             00027900
ISN 0142          COMMON   GINTPR, GRABBP, GRSUM, NPRGR                      00028000
            C                                                                00028100
ISN 0143          EQUIVALENCE  (ND(1), NDS(2), NDSS(3))                      00028200
            C                                                                00028300
            C                                                                00028400
            C     INCLUDE  DSHRHS                                            00028500
            C                                                                00028600
            C***************************  INTEGER VARIABLES  *************************00028700
            C                                                                00028800
            C THERMODYNAMIC NODE VARIABLES  (LMTHND)                         00028900
ISN 0144          INTEGER   TABL42(140)                                      00029000
            C SUBSEGMENT VARIABLES  (LINE AND VENT SHAFT SUBSEGMENT)  (LMSS) 00029100
ISN 0145          INTEGER   TABL40(300)                                      00029200
            C DYNAMIC THERMAL RESPONSE MATRIX VARIABLES  (LMEQRM)            00029300
ISN 0146          INTEGER   TABL41(120)                                      00029400
            C                                                                00029500
            C***************************  REAL VARIABLES  ****************************00029600
            C                                                                00029700
            C DYNAMIC THERMAL RESPONSE MATRIX  (LMEQRM * LMEQRM )            00029800
ISN 0147          REAL     DTRM2(14400)                                      00029900
            C                                                                00030000
            C***************************   COMMON   *********************************00030100
            C                                                                00030200
            C THERMODYNAMIC NODE VARIABLE  (LMTHND)                          00030300
ISN 0148          COMMON   /HSSHAR/  TABL42                                  00030400
            C LINE SEGMENT VARIABLES  (LMLSEG)                               00030500
ISN 0149          COMMON   /HSSHAR/  TAALS(90)                               00030600
            C VENTILATION SHAFT VARIABLES  (LMVSEG)                          00030700
ISN 0150          COMMON   /HSSHAR/  TSFV(60)                                00030800
            C SUBSEGMENT VARIABLES  (LINE AND VENT SHAFT SUBSEGMENT)  (LMSS) 00030900
ISN 0151          COMMON   /HSSHAR/  HCNLSS(300), TABL40, TMALSS(300)        00031000
            C SUBSEGMENT PLUS THERMODYNAMIC NODE VARIABLES  (LMSS + LMTHND)  00031100
ISN 0152          COMMON   /HSSHAR/  HUMESS(440), HUMMSS(440), TSFALS(440),  00031200
                 1     TSFMLS(440), TSMAX(440), TSMEAN(440), TSMN2(440), TSMX2(440) 00031300
            C DYNAMIC THERMAL (AND HUMIDITY) RESPONSE MATRIX  (LMEQRM)       00031400
            C                                                OR (LMEQRM , LMEQRM)  00031500
ISN 0153          COMMON   /HSSHAR/  DTRM(120,120), FORCE2(120), FORCE3(120), 00031600
                 1     HTSKFM(120), TABL41                                   00031700
            C                                                                00031800
ISN 0154          EQUIVALENCE (DTRM(1,1),DTRM2(1))                           00031900
            C                                                                00032000
ISN 0155          REAL      TAIR(LMSSTN), HRATIO(LMSSTN), DTDXLS(LMLSEG)     00032100
ISN 0156          REAL      DTHXLS(LMLSEG), DTWXLS(LMLSEG), HELPL(30), HELPS(30)  00032200
ISN 0157          INTEGER   IZNODE(30), IZSCT(30), IZSEG(30)                 00032300
ISN 0158       10 FORMAT (1H1,8A1,12X,'SES',7X,18A4,9X,'PAGE',/,115X,'------')  00032400
ISN 0159       20 FORMAT (1H0,T46,'ENVIRONMENTAL CONTROL SYSTEM LOAD ESTIMATES')  00032500
ISN 0160       30 FORMAT (1H0,T40,'AVERAGED SUBSEGMENT HEAT GAINS(+) OR LOSSES(-), B00032600
                 1TU/HR')                                                    00032700
ISN 0161       40 FORMAT (1H0,T48,'THE DESIGN PERIOD IS MORNING RUSH HOUR')  00032800
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ISN 0162        50 FORMAT (1H0,T48,'THE DESIGN PERIOD IS EVENING RUSH HOUR')          00032900
ISN 0163        60 FORMAT (1H0,T38,'THE DESIGN PERIOD IS NEITHER MORNING NOR EVENING 00033000
                  1RUSH HOUR')                                                         00033100
ISN 0164        70 FORMAT (1H0,'----------------  ZONE NUMBER',I3,'  -----  DESIGN ',00033200
                  1'CONDITION  -----',F6.1,' DEG F DRY BULB  -----',F6.1,' DEG F WET 00033300
                  2BULB  ----------------')                                            00033400
ISN 0165        80 FORMAT (1H0,T5,'SYSTEM',T116,'TOTAL',/,T2,'PARTITIONING',T21,'TRAI00033500
                  1NS',T36,'STEADY-STATE',T53,'HEAT SINK',T69,'AIR FLOW',T83,'ENVIRON00033600
                  2MENTAL CONTROL',T108,'ENVIRONMENTAL CONTROL',/,T113,'REQUIREMENT')00033700
ISN 0166        90 FORMAT (1H0,T16,'SENSIBLE',T26,'LATENT',T34,'SENSIBLE',T44,'LATENT00033800
                  1',T53,'SENSIBLE',T64,3('SENSIBLE    LATENT  '),T126,'TOTAL',/)    00033900
ISN 0167    100   FORMAT(1H0,'S+L BREAKDOWN',I6,6G14.7)                               00034000 <---- C
ISN 0168    110   FORMAT(1H0,'SENSIBLE',11X,5G14.7,//,1X,'LATENT',13X,5G14.7)         00034100 <---- C
ISN 0169      120 FORMAT (1H0,I3,' -',I3,' -',I2,4I9,2I11,5I10,I11)                   00034200
ISN 0170      130 FORMAT (1H ,T16,4('-------  '),T54,'-------',T65,6('-------   '),'00034300
                  1--------')                                                          00034400
ISN 0171      140 FORMAT (1H ,T3,'ZONE TOTAL ',4I9,2I11,5I10,I11)                     00034500
ISN 0172      150 FORMAT (1H0,T51,'CONVECTIVE LOAD BREAKDOWN',//,T36,'AVERAGED ZONE 00034600
                  1CONVECTIVE HEAT GAINS(+) AND LOSSES(-), BTU/HR',//,T11,'SOURCE',T200034700
                  21,'NODE',T30,'SECTION',T40,'SEGMENT',T60,'SEGMENT NAME',T87,'SENSI00034800
                  3BLE',T100,'LATENT',T113,'TOTAL',/,T13,'NO',T22,'NO',T32,'NO',T42,'00034900
                  4NO',T89,'GAIN',T101,'GAIN',/)                                       00035000
ISN 0173    160   FORMAT(1H0,'SOURCE DUMP',4I6,5X,2G14.7)                             00035100 <---- C
ISN 0174      170 FORMAT (1H ,T12,I3,T21,I3,T84,I11,T95,I12,T107,I12)                 00035200
ISN 0175      180 FORMAT (1H ,T12,I3,T31,I3,T41,I3,T48,9A4,T84,I11,T95,I12,T107,I12)00035300
ISN 0176      200 FORMAT (1H0,' IMPOSSIBLE SITUATION CREATED IN AIR CONDITIONING EST00035400
                  1IMATE SUBROUTINE')                                                  00035500
            C                                                                          00035600
            C*****LOOP OVER ALL ZONES IN SYSTEM COMPUTING AND PRINTING TOTALS FOR      00035700
            C*****EACH CONTROLLED ZONE ONLY                                            00035800
            C                                                                          00035900
ISN 0177          DO 1040 ICLST=1,NCLUST                                               00036000
            C*****CHECK IF ZONE IS A CONTROLLED ZONE - IF NOT GO TO END OF LOOP       00036100
ISN 0178          IF (TYPCL(ICLST)-1) 1040,210,1040                                    00036200
            C*****ZONE IS A CONTROLLED ZONE - WRITE PAGE HEADINGS                      00036300
ISN 0179      210 IPRINT=0                                                             00036400
ISN 0180          WRITE (OUT,10) DATE,SYSTEM                                           00036500
ISN 0181          WRITE (OUT,20)                                                       00036600
ISN 0182          WRITE (OUT,30)                                                       00036700
            C*****WRITE DESIGN PERIOD - MORNING, EVENING OR OTHER                      00036800
ISN 0183          GO TO (220,230,240), DESPER                                          00036900
ISN 0184      220 WRITE (OUT,40)                                                       00037000
ISN 0185          GO TO 250                                                            00037100
ISN 0186      230 WRITE (OUT,50)                                                       00037200
ISN 0187          GO TO 250                                                            00037300
ISN 0188      240 WRITE (OUT,60)                                                       00037400
            C*****INITIALIZE TO ZERO ZONE TOTALS THAT WILL BE COMPUTED AND PRINTED     00037500
ISN 0189      250 NUMY11=0                                                             00037600
ISN 0190          NUMY12=0                                                             00037700
ISN 0191          NUMY13=0                                                             00037800
ISN 0192          NUMY14=0                                                             00037900
ISN 0193          NUMY15=0                                                             00038000
ISN 0194          NUMY16=0                                                             00038100
ISN 0195          NUMY17=0                                                             00038200
ISN 0196          NUMY18=0                                                             00038300
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November 18, 1976

SUBWAY ENVIRONMENT SIMULATION (SES) COMPUTER PROGRAM

REVISION NO. 6 TO VERSION 2

Problem

A superannuated title appeared in the output.

Symptoms

The development of the SES computer program was sponsored by the Transit Development Corporation through a grant from UMTA and contributions made by the various operating properties. It is now being sponsored by the Department of Transportation/Transportation Systems Center. The program titling did not indicate this new sponsorship.

Correction

See the attached partial listing of Subroutine INPUT. The six lines to be corrected are indicated by a "C."

Effect on Previous Results

This problem did not affect the calculation or output of any other items.

```
          COMPILER OPTIONS - NAME=  MAIN,OPT=02,LINECNT=57,SIZE=0000K,
                             SOURCE,EBCDIC,NOLIST,NODECK,LOAD,MAP,NOEDIT,ID,NOXREF
 ISN 0002           SUBROUTINE INPUT                                          01029400
              C                                                               01029500
              C     THIS SUBROUTINE CONTROLS THE READING,CHECKING, AND INPUT  01029600
              C     VERIFICATION OF ALL THE INPUT DATA. SOME DATA IS READ BY THIS 01029700
              C     SUBROUTINE, AND SOME IS READ BY OTHER SUBROUTINES WHICH READ 01029800
              C     CERTAIN ITEMS OF DATA. THESE ARE -                        01029900
              C              LSINS  - LINE SEGMENT INPUT SUBROUTINE           01030000
              C              VSINS  - VENTILATION SHAFT INPUT SUBROUTINE      01030100
              C              TRINS  - TRAIN ROUTE INPUT SUBROUTINE            01030200
              C              GARAGE - TRAIN 'TYPE' INPUT SUBROUTINE           01030300
              C                                                               01030400
              C     OTHER SUBROUTINES WHICH ARE USED ARE -                    01030500
              C              CHECKI - CHECKS INTEGER VARIABLE BETWEEN TWO LIMITS 01030600
              C              CHECKR - CHECKS REAL VARIABLE BETWEEN TWO LIMITS 01030700
              C              ERROR  - WRITES ERROR MESSAGES                   01030800
              C                                                               01030900
              C                                                               01031000
 ISN 0003           DIMENSION    MONTHS(2,12), NUMMY1(18)                    01031100
 ISN 0004           DIMENSION    DUMMY1(8), NUMMY2(8),NUMMY3(8),NUMMY4(8),NUMMY5(8) 01031200
              C                                                               01031300
              C                                                               01031400
              C     INCLUDE  DSHARE                                           01031500
              C                                                               01031600
              C ************************* INTEGER VARIABLES ************************* C01031700
              C                                                               01031800
              C  GENERAL VARIABLES                                            01031900
 ISN 0005           INTEGER   AETIME, BLANK, BLPREQ, DATE(8), DEATH, DESPER, FSCFT 01032000
 ISN 0006           INTEGER   HCOPT, HSOPT, HUMOPT, OUT, PRTIME, SLASH, SUPOPT 01032100
 ISN 0007           INTEGER   SYSTEM(18), THOPT, THTIME, TNLSS, TNSS, TPOPT, TRTIME 01032200
              C  SECTION VARIABLES  (LMSECT)                                  01032300
 ISN 0008           INTEGER   NTQPS(140)                                      01032400
 ISN 0009           INTEGER   TABL9(140), TABL10(140), TABL11(140), TABL12(140) 01032500
 ISN 0010           INTEGER   TABL13(140), TABL20(140), TABL21(140)            01032600
              C    SECTION (LMSECT), SECTION+ONE  (LMSECT+1) ,  SECTION+TWO (LMSECT+2)01032700
 ISN 0011           INTEGER   ND(140), NDS(141), NDSS(142)                    01032800
              C    SECTION * ESTIMATED AVERAGE OF 3 LOOPS THROUGH SECTION ( LMLPK ) 01032900
 ISN 0012           INTEGER   LKAN(420)                                       01033000
              C    SECTION EXTERNAL IDENTIFICATION NUMBERS (LMSCTX)          01033100
 ISN 0013           INTEGER   TABL14(400)                                     01033200
              C  NODE VARIABLES  (LMNODE)                                     01033300
 ISN 0014           INTEGER   TABL1(132), TABL15(130), TABL16(130), TABL22(130) 01033400
 ISN 0015           INTEGER   TABL23(132), TABL45(130), TYPTND(130)            01033500
              C  AERODYNAMIC NODE VARIABLES (LMTBL2)                          01033600
 ISN 0016           INTEGER   TABL2(1500)                                     01033700
              C    NODES BY NUMBER OF SECTIONS CONNECTED TO NODE (LMNODE X LMSCND) 01033800
 ISN 0017           INTEGER   TABL17(130,5), TABL19(130,5)                    01033900
              C    NODE EXTERNAL IDENTIFICATION NUMBERS (LMSCTX)             01034000
 ISN 0018           INTEGER   TABL19(400)                                     01034100
              C  LOOP VARIABLES  (LMNLOP)                                     01034200
              C  LINE SEGMENT VARIABLES  (LMLSEG)                             01034300
 ISN 0019           INTEGER   NTRNLS(90), NUMLS(90), TABL3(90), TABL4(90), TABL8(90) 01034400
 ISN 0020           INTEGER   TYPLS(90)                                       01034500
              C    LINE SEGMENT BY NUMBER OF TRAINS IN SEGMENT  (LMLSEG X LMTRSG) 01034600
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ISN 0021          INTEGER   TRNNLS(90,8)                                          01034700
            C  VENTILATION SHAFT SEGMENT VARIABLES     ( LMVSEG )                 01034800
ISN 0022          INTEGER   FTOFVS(60), FTONVS(60), NUMVS(60)                     01034900
ISN 0023          INTEGER   TABL6(60), TYPVS(60), EXVOVS(60), FTYPVS(60), TABL5(60) 01035000
            C  SUBSEGMENT VARIABLES  (LMSS)                                       01035100
ISN 0024          INTEGER   TABL7(300), TABL44(300)                               01035200
            C  LINE SUBSEGMENT VARIABLES    ( LMLSS X TABLE SIZE )                01035300
ISN 0025          INTEGER   EXDTDB(250,6)                                         01035400
            C    LINE SUBSEGMENT BY TRAIN ROUTE ( LMLSS X LMTRRT )                01035500
ISN 0026          INTEGER   ITNLSS(250,6)                                         01035600
            C  HEATING OR COOLING ZONE CLUSTER VARIABLES  (LMCLST)                01035700
ISN 0027          INTEGER   TYPCL(30)                                             01035800
            C  SUBWAY VEHICLE TYPE VARIABLES  (LMTRTP)                            01035900
ISN 0028          INTEGER   NCARV(3), NPCARV(3)                                   01036000
            C  UNDERPLATFORM EXHAUST VARIABLES                                    01036100
ISN 0029          INTEGER   OPTUX                                                 01036200
            C  ROUTE VARIABLES  (LMTRRT)                                          01036300
ISN 0030          INTEGER   COPTRT(6), NTSRT(6)                                   01036400
            C    DISPATCHER VARIABLES (LMTRRT) AND (LMTRGP X LMTRRT)              01036500
ISN 0031          INTEGER   GRTYPV(15,6), JGROUP(6), NGRV(6), NMTRGR(6)           01036600
ISN 0032          INTEGER   NTRGR(15,6)                                           01036700
ISN 0033          INTEGER   GRHDWY(15,6)                                          01036800
            C    TRACK SECTION VARIABLES  (LMTSRT X LMTRRT)                       01036900
ISN 0034          INTEGER   DWLTS(260,6)                                          01037000
ISN 0035          INTEGER   NPETTS(260,6), NSEGTS(260,6)                          01037100
            C    EXPLICIT TRAIN PERFORMANCE VARIABLES  (LMEXPD X LMTRRT)          01037200
ISN 0036          INTEGER   NEXPOP(6)                                             01037300
ISN 0037          INTEGER   TIMEV(201,6)                                          01037400
            C  OPERATIONAL TRAIN VARIABLES  (LMTRAN)                              01037500
ISN 0038          INTEGER   DPV(30), INDEX(30), IROTEV(30), ITYPV(30), MODEV(30)  01037600
ISN 0039          INTEGER   NTSV(30), NTSV2(30), TNUMV(30)                        01037700
ISN 0040          INTEGER   TLPSV(30), TSTRTV(30)                                 01037800
            C  FAN TYPE VARIABLES  (LMFNTP)                                       01037900
            C  UNSTEADY HEAT LOAD VARIABLES  ( LMUL )                             01038000
ISN 0041          INTEGER   LSSUL(10)                                             01038100
            C  PRINT GROUP VARIABLES  ( LMPRGP )                                  01038200
ISN 0042          INTEGER   GINTPR(15), GRABBP(15), GRSUM(15), NPRGR(15)          01038300
            C                                                                     01038400
            C ************************** REAL VARIABLES ************************* C01038500
            C                                                                     01038600
            C  GENERAL VARIABLES                                                  01038700
ISN 0043          REAL      NUAIR, MPHFPS                                         01038800
            C  SECTION VARIABLES                                                  01038900
            C  NODE VARIABLES                                                     01039000
            C  LOOP VARIABLES                                                     01039100
            C  LINE SEGMENT VARIABLES                                             01039200
ISN 0044          REAL      LLS(90), LLSS(90)                                     01039300
            C  VENTILATION SHAFT SEGMENT VARIABLES                                01039400
ISN 0045          REAL      LVS(60), LVSS(60)                                     01039500
            C  SUBSEGMENT VARIABLES                                               01039600
ISN 0046          REAL      LHLTSS(300), LSUMSS(300)                              01039700
            C  LINE SUBSEGMENT VARIABLES                                          01039800
ISN 0047          REAL      LACLSS(250), LHLSS(250)                               01039900
            C  ZONE VARIABLES                                                     01040000
            C  SUBWAY VEHICLE TYPE VARIABLES                                      01040100
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ISN 0048          REAL      LAMDAV(3), LHREV(3), LV(3), MCPGAV(3), MCPGDV(3)        01040200
ISN 0049          REAL      MOTORV(3)                                               01040300
            C  ROUTE VARIABLES                                                      01040400
            C    DISPATCHER VARIABLES                                               01040500
            C    TRACK SECTION VARIABLES                                            01040600
            C    EXPLICIT TRAIN PERFORMANCE VARIABLES                               01040700
            C  OPERATIONAL TRAIN VARIABLES                                          01040800
            C  FAN TYPE VARIABLES                                                   01040900
            C  PRINT GROUP VARIABLES                                                01041000
            C                                                                       01041100
            C ****************************** COMMON ******************************C01041200
            C                                                                       01041300
            C GENERAL VARIABLES                                                     01041400
ISN 0050          COMMON    AETIME, ANNAMP, BLANK, BLPREQ, DATE, DEATH              01041500
ISN 0051          COMMON    DELAE, DELP, DELT, DELTH, DELTR, DEL2TH, DESPER, FSCFT  01041600
ISN 0052          COMMON    HCOPT, HMAMBE, HMAMBM, HOUR, HSOPT, HUMAMB, HUMOPT      01041700
ISN 0053          COMMON    IEQUAT, IN, INODE, IPRGRP, ISITU, JRATAE, JRATTH, JRATTR 01041800
ISN 0054          COMMON    KAERO, KASTEP, KBND1, KBND2, KBND3, KPRNTH, KTSTEP, LIFE 01041900
ISN 0055          COMMON    LINES, MAXTIM, MONTH, MXMNPT, NBR, NBRJCT, NCLUST, NDELT 01042000
ISN 0056          COMMON    NDTYPA, NEW, NFNTYP, NLOOP, NLS, NLSCP1, NLSEC, NNODE    01042100
ISN 0057          COMMON    NOSUMY, NOSYS, NOTRAN, NPGRP, NPORTL, NSEC, NSIMER       01042200
ISN 0058          COMMON    NTIME, NTNODE, NTRAN, NTRRTE, NTRTYP, NUMUL, NVSEC       01042300
ISN 0059          COMMON    NZONE, OUT, PAMB, PRTIME, SLASH                          01042400
ISN 0060          COMMON    SUMTST, SUPOPT, SYSTEM, TAMBA, TAMBM, TDBAMB             01042500
ISN 0061          COMMON    THOPT, THTIME, TNLSS, TNSS, TPOPT, TRTIME, TWBAMB, TWAMBE01042600
ISN 0062          COMMON    TWAMBM, WNTSUM                                           01042700
            C  ARRAY SIZE LIMITS                                                    01042800
ISN 0063          COMMON    LMBLP,LMCLST,LMCOND,LMEQRM, LMEXPD, LMFNTP, LMLPK, LMLPLK01042900
ISN 0064          COMMON    LMLSEG, LMLSS, LMNLOP, LMNODE, LMNODX, LMPRGP, LMSCND    01043000
ISN 0065          COMMON    LMSCTX, LMSECT, LMSS, LMSSTN, LMTBL2, LMTHND, LMTRAN     01043100
ISN 0066          COMMON    LMTRGP, LMTRRT, LMTRSG, LMTRTP, LMTSRT, LMUL, LMVSEG     01043200
            C  PHYSICAL CONSTANTS                                                   01043300
ISN 0067          COMMON    ABTEMP, BTUFLB, CP, FLBBTU, FLBHP, FPSMPH, FTIN, GRACC   01043400
ISN 0068          COMMON    HVH2O, MPHFPS, NUAIR, PI, PR, RDRYAR, RHOCP, RHOMAS      01043500
ISN 0069          COMMON    RHOWHT, SAINHG, SAPSI, STEFAN, THCON, TONLB, VISAIR      01043600
ISN 0070          COMMON    WGCONS, WTBTUS                                           01043700
            C  SECTION VARIABLES  ( LMSECT )                                        01043800
ISN 0071          COMMON    AHIGHS(140), ALOWS(140), BCS(140), BS(140), CEPS(140)    01043900
ISN 0072          COMMON    CENS(140), DQDTS(140), MNQS(140), MXQS(140), NTQPS       01044000
ISN 0073          COMMON    OMEGS(140), QS(140), QSAVES(140), QSMX(140), QSMN(140)   01044100
ISN 0074          COMMON    SUMQNS(140), SUMQPS(140), TABL9, TABL10, TABL11, TABL12  01044200
ISN 0075          COMMON    TABL13, TABL20, TABL21, VHIGHS(140), VLOWS(140)          01044300
            C    SECTION + TWO  (LMSECT+2)                                          01044400
ISN 0076          COMMON    NDSS                                                     01044500
            C    SECTION * ESTIMATED AVERAGE OF 3 LOOPS THROUGH SECTION ( LMLPLK )  01044600
ISN 0077          COMMON    LKAN                                                     01044700
            C    SECTION EXTERNAL IDENTIFICATION NUMBERS                            01044800
ISN 0078          COMMON    TABL14                                                   01044900
            C  NODE VARIABLES  ( LMNODE )                                           01045000
ISN 0079          COMMON    TABL1, TABL15, TABL16, TABL17, TABL18, TABL22, TABL23    01045100
ISN 0080          COMMON    TABL45, TYPTND                                           01045200
            C    NODE EXTERNAL IDENTIFICATION NUMBERS                               01045300
ISN 0081          COMMON    TABL19                                                   01045400
            C  AERODYNAMIC NODE VARIABLES  (LMTBL2)                                 01045500
ISN 0082          COMMON    TABL2                                                    01045600
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                C  AERODYNAMIC JUNCTION COEFFICIENTS ( LMCOND )                          01045700
ISN 0083           COMMON   COAEND(950)                                                 01045800
                C  THERMODYNAMIC NODE VARIABLES  ( LMTHND )                              01045900
ISN 0084           COMMON   HAVGTN(140), HUMTN(140), TAVGTN(140), TDBTN(140)             01046000
                C    THERMODYNAMIC NODES BY NUMBER OF SECTIONS CONNECTED TO A NODE       01046100
                C    ( LMTHND X LMSCND )                                                 01046200
ISN 0085           COMMON   EMHBTN(140,5), EMTBTN(140,5), FLOBTN(140,5)                 01046300
                C  LOOP VARIABLES  ( LMNLOP )                                            01046400
ISN 0086           COMMON   DQDTLP(75), OMEGLP(75), QERRLP(75), QLP(75)                 01046500
                C  AERODYNAMIC MATRIX OF COEFFICIENTS - ARRAY SIZE ESTIMATED AT          01046600
                C  APPROXIMENTLY 0.05*LMSECT**2  (LMBLP)                                 01046700
ISN 0087           COMMON   BLP(1000)                                                   01046800
                C  LINE SEGMENT VARIABLES  ( LMLSEG )                                    01046900
ISN 0088           COMMON   ALS(90), CILS(90), CBNLS(90), CBPLS(90), CFNLS(90)          01047000
ISN 0089           COMMON   CFPLS(90), DBTLS(90), DTDELS(90), DTDMLS(90), DTHELS(90)    01047100
ISN 0090           COMMON   DTHMLS(90), DTWELS(90), DTWMLS(90), EPSLS(90), FFFLS(90)    01047200
ISN 0091           COMMON   FLS(90), LLS, LLSS, NAMLS(90,9), NTRNLS, NUMLS              01047300
ISN 0092           COMMON   PDRYLS(90), PERMLS(90), RELS(90), RNFLS(90), RPRMLS(90)     01047400
ISN 0093           COMMON   SURLSS(90), TABL3, TABL4, TABL8, THCNLS(2,90)               01047500
ISN 0094           COMMON   THDFLS(2,90), TSNKLS(90), TYPLS, VOLLSS(90)                 01047600
                C    LINE SEGMENT BY NUMBER OF TRAINS IN LINE SEGMENT (LMLSEG X LMTRSG) 01047700
ISN 0095           COMMON   TRNNLS                                                      01047800
                C    LINE SEGMENT BY TWICE THE NUMBER OF TRAINS IN A LINE SEGMENT        01047900
                C    (LMLSEG X 2*LMTRSG)                                                 01048000
ISN 0096           COMMON   TRNDLS(90,16)                                               01048100
                C  VENTILATION SHAFT SEGMENT VARIABLES  ( LMVSEG )                       01048200
ISN 0097           COMMON   AGVS(60), AVS(60), EXVOVS, FDIRVS(60), FPMXVS(60)           01048300
ISN 0098           COMMON   FPMNVS(60), FTOFVS, FTONVS, FTYPVS, LVS, LVSS               01048400
ISN 0099           COMMON   NAMVS(60,9), MNFPVS(60), MXFPVS(60), NUMVS, REVS(60)        01048500
ISN 0100           COMMON   RNFVS(60), STAKVS(60), SURVSS(60), TABL5, TABL6, TYPVS      01048600
ISN 0101           COMMON   VOLVSS(60), VOMXVS(60)                                      01048700
                C  SUBSEGMENT VARIABLES (LINE AND VENT SHAFT SUBSEGMENT)  (LMSS)         01048800
ISN 0102           COMMON   DERHSS(300), DERTSS(300), EMTBSS(300), EMTFSS(300)          01048900
ISN 0103           COMMON   EMHBSS(300), EMHFSS(300), FBSS(300), FFSS(300)              01049000
ISN 0104           COMMON   FLOBSS(300), FLOFSS(300), HRMN(300), HRMX(300)              01049100
ISN 0105           COMMON   HSUMSS(300), HTRNSS(300), HTMPSS(300), HTSMSS(300)          01049200
ISN 0106           COMMON   HUMSS(300), LHLTSS, LSUMSS, MNHR(300), MNTDB(300)           01049300
ISN 0107           COMMON   MNTWB(300), MXHR(300), MXTDB(300), MXTWB(300)               01049400
ISN 0108           COMMON   QERHSS(300), QERTSS(300), QSMXSS(300), QSUMSS(300)          01049500
ISN 0109           COMMON   SHLTSS(300), SHRSS(300), SHUXSS(300), STDBSS(300)           01049600
ISN 0110           COMMON   STDNSS(300), STDPSS(300), STWBSS(300), TABL7, TDBSS(300)    01049700
ISN 0111           COMMON   TDBMN(300), TDBMX(300), TSFSS(300), TABL44, TTMPSS(300)     01049800
ISN 0112           COMMON   TWBSS(300), TWBMN(300), TWBMX(300), VOLSS(300)              01049900
                C  LINE SUBSEGMENT VARIABLES  (LMLSS)                                    01050000
ISN 0113           COMMON   EXDTDB, LACLSS, LHLSS, SACLSS(250), SHLSS(250)              01050100
                C    LINE SUBSEGMENT BY TRAIN ROUTE  (LMLSS X LMTRRT)                    01050200
ISN 0114           COMMON   ITNLSS                                                      01050300
                C  ZONE CLUSTER VARIABLES                                                01050400
ISN 0115           COMMON   TYPCL                                                       01050500
                C  SUBWAY VEHICLE TYPE VARIABLES  ( LMTRTP )                             01050600
ISN 0116           COMMON   ACACCV(3), ACCV(3), ACDECV(3), ARACCV(3), ARDECV(3)         01050700
ISN 0117           COMMON   AV(3), CDBVOV(3), CDFVOV(3), CHPR1V(3), CHPR2V(3)           01050800
ISN 0118           COMMON   COAMP(3,4), COAMPL(3,6), COATEV(3), COBTEV(3), CORMV(3,3)01050900
ISN 0119           COMMON   COTEV(3,4), DECAV(3), DECPV(3), DECV(3), DECV1V(3)          01051000
ISN 0120           COMMON   DIACGV(3), DIDCGV(3), EMISAG(3), EMISDG(3), LAMDAV, LHREV01051100
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ISN 0121          COMMON   LV. MCPGAV. MCPGDV. MOTORV. NCARV. NOPTV(3). NPCARV      01051200
ISN 0122          COMMON   PERMV(3), REGENV(3)                                      01051300
ISN 0123          COMMON   RE1M(3), RE2M(3), RE3M(3), RRACC(3), SHREV(3), SLOPEV(3) 01051400
ISN 0124          COMMON   SP1(3), SP2(3). SRE1M(3). SRE2M(3). TESP1(3)             01051500
ISN 0125          COMMON   TIACCV(3), TIDECV(3), UCHPRV(3), U2M(3), U3M(3), WV(3)   01051600
            C   UNDERPLATFORM EXHAUST VARIABLES                                     01051700
ISN 0126          COMMON   EFSUX, EFMUX, OPTUX, UMAXUX                              01051800
            C  ROUTE VARIABLES  ( LMTRRT )                                          01051900
ISN 0127          COMMON   COPTRT, NTSRT, ORIGRT(6), UMINRT(6)                      01052000
            C    DISPATCHER VARIABLES  ( LMTRRT ) AND ( LMTRGP X LMTRRT )           01052100
ISN 0128          COMMON   GRHDWY, GRTYPV, JGROUP, NGRV, NMTRGR, NTIMTR(6)          01052200
ISN 0129          COMMON   NTRGR, NUMBTR                                            01052300
            C    TRACK SECTION VARIABLES  ( LMTSRT X LMTRRT )                       01052400
ISN 0130          COMMON   DWLTS. FSTS(260.6). GRDTS(260,6), NPETTS                 01052500
ISN 0131          COMMON   NSEGTS, RADTS(260,6), UMXTS(260,6)                       01052600
            C    EXPLICIT TRAIN PERFORMANCE VARIABLES  ( LMEXPD X LMTRRT )          01052700
ISN 0132          COMMON   NEXPDP. QGRIDV(201.6). SPEEDV(201.6). TIMEV              01052800
            C  OPERATIONAL TRAIN VARIABLES  ( LMTRAN )                              01052900
ISN 0133          COMMON   AMPV(30), AMPLV(30), ANVV(30), DGRDQV(30), DPV, DRAGV(30)01053000
ISN 0134          COMMON   DUDTV(30). INDEX. IROTEV. ITYPV. MODEV. NTSV             01053100
ISN 0135          COMMON   NTSV2, QACCV(30), QDECV(30), QERACV(30), QERDCV(30)      01053200
ISN 0136          COMMON   QTRPF(30), RGSUMV(30), RMHTV(30), RSISTV(30), TAAVGV(30) 01053300
ISN 0137          COMMON   TEV(30). TGACCV(30). TGDECV(30). TLPSV. TNUMV. TSTRTV    01053400
ISN 0138          COMMON   TWAVGV(30), UV(30), WPATV(30), XLASTV(30), XV(30)        01053500
            C  FAN TYPE VARIABLES  ( LMFNTP )                                       01053600
ISN 0139          COMMON   CFMHFT(4), CFMLFT(4), FN1IFT(4). FN2IFT(4). FN3IFT(4)    01053700
ISN 0140          COMMON   FN4IFT(4), FN1OFT(4), FN2OFT(4), FN3OFT(4), FN4OFT(4)    01053800
ISN 0141          COMMON   TIMFT(4)                                                 01053900
            C  UNSTEADY HEAT LOAD VARIABLES  ( LMUL )                               01054000
ISN 0142          COMMON   HLLUL(10), HLSUL(10), LSSUL, LTONUL(10), LTOFUL(10)      01054100
            C  PATRON CHARACTERISTICS                                               01054200
ISN 0143          COMMON   PATWHT                                                   01054300
            C  PRINT GROUP VARIABLES  ( LMPRGP )                                    01054400
ISN 0144          COMMON   GINTPR, GRABBP, GRSUM, NPRGR                             01054500
            C                                                                       01054600
ISN 0145          EQUIVALENCE  (ND(1). NDS(2). NDSS(3))                             01054700
            C                                                                       01054800
            C                                                                       01054900
            C                                                                       01055000
            C                                                                       01055100
ISN 0146          DATA MONTHS /  4HJANU,4HARY ,4HFEBR,4HUARY,4HMARC,4HH    ,        01055200
                1 4HAPRI,4HL    ,4HMAY ,4H     ,4HJUNE.4H     .4HJULY.4H     .       01055300
                2 4HAUGU,4HST   ,4HSEPT,4H.    ,4HOCTO.4HBER ,4HNOVE,4HMBER,         01055400
                3 4HDECE,4HMBER /                                                   01055500
ISN 0147     10   FORMAT (1H1,8A1,8X,'SES',10X,17A4,A2,9X,'PAGE'./.115X,'------')   01055600
ISN 0148     20   FORMAT (17A4,A2)                                                  01055700
ISN 0149     30   FORMAT (8F10.2)                                                   01055800
ISN 0150     40   FORMAT (9A4,4X,4F10.2)                                            01055900
ISN 0151     50   FORMAT (1H1.4(/).T30.'DEPARTMENT OF TRANSPORTATION / TRANSPORTATI01056000 <-- C
                1N SYSTEMS CENTER',5(/),T49,5('X'),3X,7('X'),3X,5('X'),/,T48,'X',T501056100 <-- C
                27,'X',T66,'X',/,T49,5('X'),T57,5('X'),T67,5('X'),/,T54,'X',T57,'X'01056200 <-- C
                3.T72.'X'./.T54.'X'.T57.'X'.T72.'X'./.T48.6('X').T57,7('X'),T66,6('01056300 <-- C
                4X'),///,T46,'SUBWAY ENVIRONMENT SIMULATION',6(/))                  01056400 <-- C
ISN 0152     60   FORMAT (1H ,T52,'SIMULATION OF',////,25X,17A4,A2////25X,17A4,A2///01056500
                1/)                                                                 01056600
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ISN 0153     70    FORMAT (25X,17A4,A2,////)                                    01056700
ISN 0154     80    FORMAT (1H ,36X,'DESIGN TIME',I5,' HRS',3X,2A4,I6,///)       01056800
ISN 0155     90    FORMAT (1H ,38X,'DESIGN TIME 0',I3,' HRS',3X,2A4,I6,/)       01056900
ISN 0156    100    FORMAT (1H ,56X,8A1,//T95,'PREPARED BY -'//,T97,'PARSONS, BRINCKER01057000
                  1HOFF.',/,T97,'QUADE AND DOUGLAS, INC.',/,T97,'NEW YORK, NEW YORK',01057100
                  2/,T97,'VERSION 2.07')                                       01057200 ◄—— C
ISN 0157    110    FORMAT (1H0,T45,'INPUT VERIFICATION OF GENERAL DATA')        01057300
ISN 0158    120    FORMAT (1H0,T113,'FORM 1C'/T30,'TRAIN PERFORMANCE OPTION',T80,I5,T01057400
                  190,'BYPASS')                                                01057500
ISN 0159    130    FORMAT (1H0,T113,'FORM 1C'/T30,'TRAIN PERFORMANCE OPTION',T80,I5,T01057600
                  190,'IMPLICIT')                                              01057700
ISN 0160    140    FORMAT (1H0,T113,'FORM 1C'/T30,'TRAIN PERFORMANCE OPTION',T80,I5,T01057800
                  190,'EXPLICIT (HEAT REJ. COMPUTED)')                         01057900
ISN 0161    150    FORMAT (1H0,T113,'FORM 1C'/T30,'TRAIN PERFORMANCE OPTION',T80,I5,T01058000
                  190,'EXPLICIT (HEAT REJ. INPUT)')                            01058100
ISN 0162    160    FORMAT (1H0,T30,'TEMPERATURE / HUMIDITY SIMULATION OPTION',T80,I5,01058200
                  1T90,'BYPASS')                                               01058300
ISN 0163    170    FORMAT (1H0,T30,'TEMPERATURE / HUMIDITY SIMULATION OPTION',T80,I5,01058400
                  1T90,'YES')                                                  01058500
ISN 0164    180    FORMAT (1H0,T30,'TEMPERATURE / HUMIDITY SIMULATION OPTION',T80,I5,01058600
                  1T90,'YES - EVAPORATION')                                    01058700
ISN 0165    190    FORMAT (1H0,T30,'HUMIDITY DISPLAY OPTION',T80,I5,T90,'HUMIDITY RAT01058800
                  1IO')                                                        01058900
ISN 0166    200    FORMAT (1H0,T30,'HUMIDITY DISPLAY OPTION',T80,I5,T90,'WET-BULB TEM01059000
                  1PERATURE')                                                  01059100
ISN 0167    210    FORMAT (1H0,T30,'HUMIDITY DISPLAY OPTION',T80,I5,T90,'RELATIVE HUM01059200
                  1IDITY')                                                     01059300
ISN 0168    220    FORMAT (1H0,T30,'ENVIRONMENTAL CONTROL LOAD EVALUATION OPTION',T8001059400
                  1,I5,T90,'BYPASS')                                           01059500
ISN 0169    230    FORMAT (1H0,T30,'ENVIRONMENTAL CONTROL LOAD EVALUATION OPTION',T8001059600
                  1,I5,T90,'YES')                                              01059700
ISN 0170    240    FORMAT (1H0,T30,'ENVIRONMENTAL CONTROL LOAD EVALUATION OPTION',T8001059800
                  1,I5,T90,'OFF-HOUR')                                         01059900
ISN 0171    250    FORMAT (1H0,T30,'HEAT SINK SUMMARY PRINT OPTION',T80,I5,T90,'BYPAS01060000
                  1S')                                                         01060100
ISN 0172    260    FORMAT (1H0,T30,'HEAT SINK SUMMARY PRINT OPTION',T80,I5,T90,'YES')01060200
ISN 0173    270    FORMAT (1H0,T30,'SUPPLEMENTARY OUTPUT OPTION',T80,I5)        01060300
ISN 0174    280    FORMAT (1H0,T30,'ALLOWABLE SIMULATION ERRORS',T80,I5)        01060400
ISN 0175    290    FORMAT (1H0,T30,'ALLOWABLE INPUT ERRORS',T80,I5)             01060500
ISN 0176    300    FORMAT (1H0,T30,'ALLOWABLE INPUT ERRORS',T80,I5,T90,'NO SIMULATION01060600
                  1')                                                          01060700
ISN 0177    310    FORMAT (/1H0,T30,'NUMBER OF LINE SEGMENTS',T80,I5,T113,'FORM 1D') 01060800
ISN 0178    320    FORMAT (1H0,T30,'TOTAL NUMBER OF SECTIONS',T80,I5)           01060900
ISN 0179    330    FORMAT (1H0,T30,'NUMBER OF VENTILATION SHAFT SECTIONS',T80,I5)  01061000
ISN 0180    340    FORMAT (1H0,T30,'NUMBER OF NODES',T80,I5)                    01061100
ISN 0181    350    FORMAT (1H0,T30,'NUMBER OF BRANCHED JUNCTIONS',T80,I5)       01061200
ISN 0182    360    FORMAT (1H0,T30,'NUMBER OF PORTALS',T80,I5)                  01061300
ISN 0183    370    FORMAT (1H0,T30,'NUMBER OF UNSTEADY HEAT SOURCES',T80,I5)    01061400
ISN 0184    380    FORMAT (1H0,T30,'NUMBER OF FAN TYPES',T80,I5)                01061500
ISN 0185    390    FORMAT (1H0,T30,'NUMBER OF TRAIN ROUTES',T80,I5,T113,'FORM 1E')  01061600
ISN 0186    400    FORMAT (1H0,T30,'NUMBER OF TRAIN TYPES',T80,I5)              01061700
ISN 0187    410    FORMAT (1H0,T30,'NUMBER OF ENVIRONMENTAL CONTROL ZONES',T80,I5)  01061800
ISN 0188    420    FORMAT (1H0,T30,'FAN STOPPING/WINDMILLING OPTION',T80,I5)    01061900
ISN 0189    430    FORMAT (1H+,T90,'MEANINGLESS')                               01062000
ISN 0190    440    FORMAT (1H+,T90,'SIMULATION TERMINATION')                    01062100
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November 18, 1976

SUBWAY ENVIRONMENT SIMULATION (SES) COMPUTER PROGRAM

REVISION NO. 7 TO VERSION 2

Problem

Program response following the diagnosis of a fatal error in an input data set was occasionally wrong.

Symptoms

Following the diagnosis of a fatal error in an input data deck, the program searches for either a blank card (program termination) or a card with two slashes in card columns 71 through 78 (beginning of a new data set). This process occasionally ended with the program mistakenly determining that a non-blank card had two slashes in card columns 71 through 78. The resulting program output would then show the beginning of the input verification of a non-existent data deck followed by more fatal errors, etc.

Correction

See the attached partial listing of the Mainline Program DSES. The four lines to be corrected are indicated by a "C."

Effect on Previous Results

This problem did not affect the calculation or output of any items. Future input verifications terminated by a fatal error will tend to be less voluminous.

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        COMPILER OPTIONS - NAME=  MAIN,OPT=02,LINECNT=57,SIZE=0000K,
                           SOURCE,EBCDIC,NOLIST,NODECK,LOAD,MAP,NOEDIT,ID,NOXREF
ISN 0002            INTEGER  BLANK2,SLASH2                                    00295800
              C     INCLUDE  DSHARE                                           00295900
              C                                                               00296000
              C ************************ INTEGER VARIABLES ************************ C00296100
              C                                                               00296200
              C  GENERAL VARIABLES                                            00296300
ISN 0003            INTEGER   AETIME, BLANK, BLPREQ, DATE(8), DEATH, DESPER, FSCFT    00296400
ISN 0004            INTEGER   HCOPT, HSOPT, HUMOPT, OUT, PRTIME, SLASH, SUPOPT        00296500
ISN 0005            INTEGER   SYSTEM(18), THOPT, THTIME, TNLSS, TNSS, TPOPT, TRTIME   00296600
              C  SECTION VARIABLES  (LMSECT)                                  00296700
ISN 0006            INTEGER   NTQPS(140)                                      00296800
ISN 0007            INTEGER   TABL9(140), TABL10(140), TABL11(140), TABL12(140)        00296900
ISN 0008            INTEGER   TABL13(140), TABL20(140), TABL21(140)                   00297000
              C    SECTION (LMSECT), SECTION+ONE  (LMSECT+1) ,  SECTION+TWO (LMSECT+2)00297100
ISN 0009            INTEGER   ND(140), NDS(141), NDSS(142)                    00297200
              C    SECTION * ESTIMATED AVERAGE OF 3 LOOPS THROUGH SECTION ( LMLPK )   00297300
ISN 0010            INTEGER   LKAN(420)                                       00297400
              C    SECTION EXTERNAL IDENTIFICATION NUMBERS (LMSCTX)           00297500
ISN 0011            INTEGER   TABL14(400)                                     00297600
              C  NODE VARIABLES  (LMNODE)                                     00297700
ISN 0012            INTEGER   TABL1(132), TABL15(130), TABL16(130), TABL22(130)        00297800
ISN 0013            INTEGER   TABL23(132), TABL45(130), TYPTND(130)                   00297900
              C  AERODYNAMIC NODE VARIABLES (LMTBL2)                          00298000
ISN 0014            INTEGER   TABL2(1500)                                     00298100
              C    NODES BY NUMBER OF SECTIONS CONNECTED TO NODE (LMNODE X LMSCND)    00298200
ISN 0015            INTEGER   TABL17(130,5), TABL18(130,5)                    00298300
              C    NODE EXTERNAL IDENTIFICATION NUMBERS (LMSCTX)              00298400
ISN 0016            INTEGER   TABL19(400)                                     00298500
              C  LOOP VARIABLES  (LMNLOP)                                     00298600
              C  LINE SEGMENT VARIABLES  (LMLSEG)                             00298700
ISN 0017            INTEGER   NTRNLS(90), NUMLS(90), TABL3(90), TABL4(90), TABL8(90)  00298800
ISN 0018            INTEGER   TYPLS(90)                                       00298900
              C    LINE SEGMENT BY NUMBER OF TRAINS IN SEGMENT  (LMLSEG X LMTRSG)     00299000
ISN 0019            INTEGER   TRNNLS(90,8)                                    00299100
              C  VENTILATION SHAFT SEGMENT VARIABLES    ( LMVSEG )            00299200
ISN 0020            INTEGER   FTOFVS(60), FTONVS(60), NUMVS(60)               00299300
ISN 0021            INTEGER   TABL6(60), TYPVS(60), EXVOVS(60), FTYPVS(60), TABL5(60) 00299400
              C  SUBSEGMENT VARIABLES  (LMSS)                                 00299500
ISN 0022            INTEGER   TABL7(300), TABL44(300)                         00299600
              C  LINE SUBSEGMENT VARIABLES   ( LMLSS X TABLE SIZE )           00299700
ISN 0023            INTEGER   EXDTDB(250,6)                                   00299800
              C    LINE SUBSEGMENT BY TRAIN ROUTE ( LMLSS X LMTRRT )          00299900
ISN 0024            INTEGER   ITNLSS(250,6)                                   00300000
              C  HEATING OR COOLING ZONE CLUSTER VARIABLES  (LMCLST)          00300100
ISN 0025            INTEGER   TYPCL(30)                                       00300200
              C  SUBWAY VEHICLE TYPE VARIABLES  (LMTRTP)                      00300300
ISN 0026            INTEGER   NCARV(3), NPCARV(3)                             00300400
              C  UNDERPLATFORM EXHAUST VARIABLES                              00300500
ISN 0027            INTEGER   OPTUX                                           00300600
              C  ROUTE VARIABLES  (LMTRRT)                                    00300700
ISN 0028            INTEGER   COPTRT(6), NTSRT(6)                             00300800
              C    DISPATCHER VARIABLES (LMTRRT) AND (LMTRGP X LMTRRT)        00300900
ISN 0029            INTEGER   GRTYPV(15,6), JGROUP(6), NGRV(6), NMTRGR(6)     00301000
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ISN 0030          INTEGER   NTRGR(15,6)                                          00301100
ISN 0031          INTEGER   GRHDWY(15,6)                                         00301200
            C    TRACK SECTION VARIABLES  (LMTSRT X LMTRRT)                      00301300
ISN 0032          INTEGER   DWLTS(260,6)                                         00301400
ISN 0033          INTEGER   NPETTS(260,6), NSEGTS(260,6)                         00301500
            C    EXPLICIT TRAIN PERFORMANCE VARIABLES  (LMEXPD X LMTRRT)         00301600
ISN 0034          INTEGER   NEXPOP(6)                                            00301700
ISN 0035          INTEGER   TIMEV(201,6)                                         00301800
            C  OPERATIONAL TRAIN VARIABLES  (LMTRAN)                             00301900
ISN 0036          INTEGER   OPV(30), INDEX(30), IROTEV(30), ITYPV(30), MODEV(30) 00302000
ISN 0037          INTEGER   NTSV(30), NTSV2(30), TNUMV(30)                       00302100
ISN 0038          INTEGER   TLPSV(30), TSTRTV(30)                                00302200
            C  FAN TYPE VARIABLES  (LMFNTP)                                      00302300
            C  UNSTEADY HEAT LOAD VARIABLES  ( LMUL )                            00302400
ISN 0039          INTEGER   LSSUL(10)                                            00302500
            C  PRINT GROUP VARIABLES  ( LMPRGP )                                 00302600
ISN 0040          INTEGER   GINTPR(15), GRABBP(15), GRSUM(15), NPRGR(15)         00302700
            C                                                                    00302800
            C ************************* REAL VARIABLES ************************* C00302900
            C                                                                    00303000
            C  GENERAL VARIABLES                                                 00303100
ISN 0041          REAL      NUAIR, MPHFPS                                        00303200
            C  SECTION VARIABLES                                                 00303300
            C  NODE VARIABLES                                                    00303400
            C  LOOP VARIABLES                                                    00303500
            C  LINE SEGMENT VARIABLES                                            00303600
ISN 0042          REAL      LLS(90), LLSS(90)                                    00303700
            C  VENTILATION SHAFT SEGMENT VARIABLES                               00303800
ISN 0043          REAL      LVS(60), LVSS(60)                                    00303900
            C  SUBSEGMENT VARIABLES                                              00304000
ISN 0044          REAL      LHLTSS(300), LSUMSS(300)                             00304100
            C  LINE SUBSEGMENT VARIABLES                                         00304200
ISN 0045          REAL      LACLSS(250), LHLSS(250)                              00304300
            C  ZONE VARIABLES                                                    00304400
            C  SUBWAY VEHICLE TYPE VARIABLES                                     00304500
ISN 0046          REAL      LAMDAV(3), LHREV(3), LV(3), MCPGAV(3), MCPGDV(3)     00304600
ISN 0047          REAL      MOTORV(3)                                            00304700
            C  ROUTE VARIABLES                                                   00304800
            C    DISPATCHER VARIABLES                                            00304900
            C    TRACK SECTION VARIABLES                                         00305000
            C    EXPLICIT TRAIN PERFORMANCE VARIABLES                            00305100
            C  OPERATIONAL TRAIN VARIABLES                                       00305200
            C  FAN TYPE VARIABLES                                                00305300
            C  PRINT GROUP VARIABLES                                             00305400
            C                                                                    00305500
            C ****************************** COMMON ****************************** C00305600
            C                                                                    00305700
            C GENERAL VARIABLES                                                  00305800
ISN 0048          COMMON    AETIME, ANNAMP, BLANK, BLPREQ, DATE, DEATH           00305900
ISN 0049          COMMON    DELAE, DELP, DELT, DELTH, DELTR, DEL2TH, DESPER, FSCFT 00306000
ISN 0050          COMMON    HCOPT, HMAMBE, HMAMBM, HOUR, HSOPT, HUMAMB, HUMOPT   00306100
ISN 0051          COMMON    IEQUAT, IN, INODE, IPRGRP, ISITU, JRATAE, JRATTH, JRATTR 00306200
ISN 0052          COMMON    KAERO, KASTEP, KBND1, KBND2, KBND3, KPRNTH, KTSTEP, LIFE 00306300
ISN 0053          COMMON    LINES, MAXTIM, MONTH, MXMNPT, NBR, NBRJCT, NCLUST, NDELT 00306400
ISN 0054          COMMON    NDTYPA, NEW, NFNTYP, NLOOP, NLS, NLSCP1, NLSEC, NNODE 00306500
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ISN 0055          COMMON   NOSUMY, NOSYS, NOTRAN, NPGRP, NPORTL, NSEC, NSIMER        00306600
ISN 0056          COMMON   NTIME, NTNODE, NTRAN, NTRRTE, NTRTYP, NUMUL, NVSEC        00306700
ISN 0057          COMMON   NZONE, OUT, PAMB, PRTIME, SLASH                           00306800
ISN 0058          COMMON   SUMTST, SUPOPT, SYSTEM, TAMBA, TAMBM, TDBAMB              00306900
ISN 0059          COMMON   THOPT, THTIME, TNLSS, TNSS, TPOPT, TRTIME, TWBAMB, TWAMBE00307000
ISN 0060          COMMON   TWAMBM, WNTSUM                                            00307100
            C  ARRAY SIZE LIMITS                                                     00307200
ISN 0061          COMMON   LMBLP,LMCLST,LMCOND,LMEQPM, LMEXPD, LMFNTP, LMLPK, LMLPLK00307300
ISN 0062          COMMON   LMLSEG, LMLSS, LMNLOP, LMNODE, LMNODX, LMPRGP, LMSCND    00307400
ISN 0063          COMMON   LMSCTX, LMSECT, LMSS, LMSSTN, LMTBL2, LMTHND, LMTRAN     00307500
ISN 0064          COMMON   LMTRGP, LMTRRT, LMTRSG, LMTRTP, LMTSRT, LMUL, LMVSEG     00307600
            C  PHYSICAL CONSTANTS                                                    00307700
ISN 0065          COMMON   ABTEMP, BTUFLB, CP, FLBBTU, FLBHP, FPSMPH, FTIN, GRACC   00307800
ISN 0066          COMMON   HVH2O, MPHFPS, NUAIR, PI, PR, RDRYAR, RHOCP, RHOMAS      00307900
ISN 0067          COMMON   RHOWHT, SAINHG, SAPSI, STEFAN, THCON, TONLB, VISAIR      00308000
ISN 0068          COMMON   WGCONS, WTBTUS                                           00308100
            C  SECTION VARIABLES  ( LMSECT )                                         00308200
ISN 0069          COMMON   AHIGHS(140), ALOWS(140), BCS(140), BS(140), CEPS(140)    00308300
ISN 0070          COMMON   CFNS(140), DQDTS(140), MNQS(140), MXQS(140), NTQPS       00308400
ISN 0071          COMMON   OMEGS(140), QS(140), QSAVES(140), QSMX(140), QSMN(140)   00308500
ISN 0072          COMMON   SUMQNS(140), SUMQPS(140), TABL9, TABL10, TABL11, TABL12  00308600
ISN 0073          COMMON   TABL13, TABL20, TABL21, VHIGHS(140), VLOWS(140)          00308700
            C    SECTION + TWO  (LMSECT+2)                                           00308800
ISN 0074          COMMON   NOSS                                                     00308900
            C    SECTION * ESTIMATED AVERAGE OF 3 LOOPS THROUGH SECTION ( LMLPLK )  00309000
ISN 0075          COMMON   LKAN                                                     00309100
            C    SECTION EXTERNAL IDENTIFICATION NUMBERS                             00309200
ISN 0076          COMMON   TABL14                                                   00309300
            C  NODE VARIABLES  ( LMNODE )                                            00309400
ISN 0077          COMMON   TABL1, TABL15, TABL16, TABL17, TABL18, TABL22, TABL23    00309500
ISN 0078          COMMON   TABL45, TYPTND                                           00309600
            C    NODE EXTERNAL IDENTIFICATION NUMBERS                                00309700
ISN 0079          COMMON   TABL19                                                   00309800
            C  AERODYNAMIC NODE VARIABLES  (LMTBL2)                                  00309900
ISN 0080          COMMON   TABL2                                                    00310000
            C  AERODYNAMIC JUNCTION COEFFICIENTS ( LMCOND )                          00310100
ISN 0081          COMMON   COAEND(950)                                              00310200
            C  THERMODYNAMIC NODE VARIABLES  ( LMTHND )                              00310300
ISN 0082          COMMON   HAVGTN(140), HUMTN(140), TAVGTN(140), TDBTN(140)         00310400
            C    THERMODYNAMIC NODES BY NUMBER OF SECTIONS CONNECTED TO A NODE       00310500
            C    ( LMTHND X LMSCND )                                                 00310600
ISN 0083          COMMON   EMHBTN(140,5), EMTBTN(140,5), FLOBTN(140,5)              00310700
            C  LOOP VARIABLES  ( LMNLOP )                                            00310800
ISN 0084          COMMON   DQDTLP(75), OMEGLP(75), QERRLP(75), QLP(75)              00310900
            C  AERODYNAMIC MATRIX OF COEFFICIENTS - ARRAY SIZE ESTIMATED AT          00311000
            C  APPROXIMENTLY 0.05*LMSECT**2  (LMBLP)                                 00311100
ISN 0085          COMMON   BLP(1000)                                                00311200
            C  LINE SEGMENT VARIABLES  ( LMLSEG )                                    00311300
ISN 0086          COMMON   ALS(90), CILS(90), CBNLS(90), CBPLS(90), CFNLS(90)       00311400
ISN 0087          COMMON   CFPLS(90), DBTLS(90), DTDELS(90), DTDMLS(90), DTHELS(90) 00311500
ISN 0088          COMMON   DTHMLS(90), DTWELS(90), DTWMLS(90), EPSLS(90), FEFLS(90) 00311600
ISN 0089          COMMON   FLS(90), LLS, LLSS, NAMLS(90,9), NTRNLS, NUMLS           00311700
ISN 0090          COMMON   PDRYLS(90), PERMLS(90), RELS(90), RNFLS(90), RPRMLS(90)  00311800
ISN 0091          COMMON   SURLSS(90), TABL3, TABL4, TABL8, THCNLS(2,90)            00311900
ISN 0092          COMMON   THDFLS(2,90), TSNKLS(90), TYPLS, VOLLSS(90)              00312000
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                C    LINE SEGMENT BY NUMBER OF TRAINS IN LINE SEGMENT (LMLSEG X LMTRSG) 00312100
ISN 0093             COMMON   TRNNLS                                                   00312200
                C    LINE SEGMENT BY TWICE THE NUMBER OF TRAINS IN A LINE SEGMENT       00312300
                C    (LMLSEG X 2*LMTRSG)                                                00312400
ISN 0094             COMMON   TRNDLS(90,16)                                             00312500
                C  VENTILATION SHAFT SEGMENT VARIABLES  ( LMVSEG )                      00312600
ISN 0095             COMMON   AGVS(60), AVS(60), EXVOVS, FDIRVS(60), FPMXVS(60)         00312700
ISN 0096             COMMON   FPMNVS(60), FTOFVS, FTONVS, FTYPVS, LVS, LVSS             00312800
ISN 0097             COMMON   NAMVS(60,9), MNFPVS(60), MXFPVS(60), NUMVS, REVS(60)      00312900
ISN 0098             COMMON   RNFVS(60), STAKVS(60), SURVSS(60), TABL5, TABL6, TYPVS    00313000
ISN 0099             COMMON   VOLVSS(60), VOMXVS(60)                                    00313100
                C  SUBSEGMENT VARIABLES (LINE AND VENT SHAFT SUBSEGMENT)  (LMSS)        00313200
ISN 0100             COMMON   DERHSS(300), DERTSS(300), EMTBSS(300), EMTFSS(300)        00313300
ISN 0101             COMMON   FMHBSS(300), EMHFSS(300), FBSS(300), FFSS(300)            00313400
ISN 0102             COMMON   FLOBSS(300), FLOFSS(300), HRMN(300), HRMX(300)            00313500
ISN 0103             COMMON   HSUMSS(300), HTRNSS(300), HTMPSS(300), HTSMSS(300)        00313600
ISN 0104             COMMON   HUMSS(300), LHLTSS, LSUMSS, MNHP(300), MNTDB(300)         00313700
ISN 0105             COMMON   MNTWB(300), MXHR(300), MXTDB(300), MXTWB(300)             00313800
ISN 0106             COMMON   QERHSS(300), QERTSS(300), QSMXSS(300), QSUMSS(300)        00313900
ISN 0107             COMMON   SHLTSS(300), SHRSS(300), SHUXSS(300), STDBSS(300)         00314000
ISN 0108             COMMON   STDNSS(300), STDPSS(300), STWBSS(300), TABL7, TDBSS(300) 00314100
ISN 0109             COMMON   TDBMN(300), TDBMX(300), TSFSS(300), TABL44, TTMPSS(300)  00314200
ISN 0110             COMMON   TWBSS(300), TWBMN(300), TWBMX(300), VOLSS(300)            00314300
                C  LINE SUBSEGMENT VARIABLES  (LMLSS)                                   00314400
ISN 0111             COMMON   EXDTDB, LACLSS, LHLSS, SACLSS(250), SHLSS(250)            00314500
                C    LINE SUBSEGMENT BY TRAIN ROUTE  (LMLSS X LMTRRT)                   00314600
ISN 0112             COMMON   ITNLSS                                                    00314700
                C  ZONE CLUSTER VARIABLES                                               00314800
ISN 0113             COMMON   TYPCL                                                     00314900
                C  SUBWAY VEHICLE TYPE VARIABLES  ( LMTRTP )                            00315000
ISN 0114             COMMON   ACACCV(3), ACCV(3), ACDECV(3), ARACCV(3), ARDECV(3)       00315100
ISN 0115             COMMON   AV(3), CDBVOV(3), CDFVOV(3), CHPR1V(3), CHPR2V(3)         00315200
ISN 0116             COMMON   COAMP(3,4), COAMPL(3,6), COATEV(3), COBTEV(3), CORMV(3,3)00315300
ISN 0117             COMMON   COTEV(3,4), DECAV(3), DECBV(3), DECV(3), DECV1V(3)        00315400
ISN 0118             COMMON   DIACGV(3), DIDCGV(3), EMISAG(3), EMISDG(3), LAMDAV, LHREV00315500
ISN 0119             COMMON   LV, MCPGAV, MCPGDV, MOTORV, NCARV, NOPTV(3), NPCARV       00315600
ISN 0120             COMMON   PERMV(3), REGENV(3)                                       00315700
ISN 0121             COMMON   RE1M(3), RE2M(3), RE3M(3), RPACC(3), SHREV(3), SLOPEV(3) 00315800
ISN 0122             COMMON   SP1(3), SP2(3), SRE1M(3), SRE2M(3), TESP1(3)              00315900
ISN 0123             COMMON   TIACCV(3), TIDECV(3), UCHPRV(3), U2M(3), U3M(3), WV(3)    00316000
                C   UNDERPLATFORM EXHAUST VARIABLES                                     00316100
ISN 0124             COMMON   EFSUX, EFMUX, OPTUX, UMAXUX                               00316200
                C  ROUTE VARIABLES  ( LMTRRT )                                          00316300
ISN 0125             COMMON   COPTRT, NTSRT, ORIGRT(6), UMINRT(6)                       00316400
                C    DISPATCHER VARIABLES  ( LMTRRT ) AND ( LMTRGP X LMTRRT )           00316500
ISN 0126             COMMON   GRHDWY, GRTYPV, JGROUP, NGRV, NMTRGR, NTIMTR(6)           00316600
ISN 0127             COMMON   NTRGR, NUMBTR                                             00316700
                C    TRACK SECTION VARIABLES  ( LMTSRT X LMTRRT )                       00316800
ISN 0128             COMMON   DWLTS, FSTS(260,6), GRDTS(260,6), NPETTS                  00316900
ISN 0129             COMMON   NSEGTS, RADTS(260,6), UMXTS(260,6)                        00317000
                C    EXPLICIT TRAIN PERFORMANCE VARIABLES  ( LMEXPD X LMTRRT )          00317100
ISN 0130             COMMON   NEXPDP, QGRIDV(201,6), SPEEDV(201,6), TIMEV               00317200
                C  OPERATIONAL TRAIN VARIABLES  ( LMTRAN )                              00317300
ISN 0131             COMMON   AMPV(30), AMPLV(30), ANVV(30), DGRDQV(30), DPV, DRAGV(30)00317400
ISN 0132             COMMON   DUDTV(30), INDEX, IROTEV, ITYPV, MODEV, NTSV              00317500
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ISN 0133          COMMON   NTSV2, QACCV(30), QDECV(30), QERACV(30), QERDCV(30)      00317600
ISN 0134          COMMON   QTRPF(30), RGSUMV(30), RMHTV(30), RSISTV(30), TAAVGV(30) 00317700
ISN 0135          COMMON   TEV(30), TGACCV(30), TGDECV(30), TLPSV, TNUMV, TSTRTV    00317800
ISN 0136          COMMON   TWAVGV(30), UV(30), WPATV(30), XLASTV(30), XV(30)        00317900
            C  FAN TYPE VARIABLES  ( LMFNTP )                                       00318000
ISN 0137          COMMON   CFMHFT(4), CFMLFT(4), FN1IFT(4), FN2IFT(4), FN3IFT(4)    00318100
ISN 0138          COMMON   FN4IFT(4), FN1OFT(4), FN2OFT(4), FN3OFT(4), FN4OFT(4)    00318200
ISN 0139          COMMON   TIMFT(4)                                                 00318300
            C  UNSTEADY HEAT LOAD VARIABLES  ( LMUL )                               00318400
ISN 0140          COMMON   HLLUL(10), HLSUL(10), LSSUL, LTONUL(10), LTOFUL(10)      00318500
            C  PATRON CHARACTERISTICS                                               00318600
ISN 0141          COMMON   PATWHT                                                   00318700
            C  PRINT GROUP VARIABLES  ( LMPRGP )                                    00318800
ISN 0142          COMMON   GINTPR, GRABBP, GRSUM, NPRGR                             00318900
            C                                                                       00319000
ISN 0143          EQUIVALENCE  (ND(1), NDS(2), NDSS(3))                             00319100
            C                                                                       00319200
            C                                                                       00319300
ISN 0144          DATA   SLASH2, BLANK2 / 1H/, 1H  /                                00319400
ISN 0145        1 FORMAT( 1H1 )                                                     00319500
ISN 0146        2 FORMAT(  17A4,A2,8A1,A2  )                                        00319600
ISN 0147        3 FORMAT( 1H0, 15X,17A4,A2,8A1,A2 )                                 00319700
ISN 0148        4 FORMAT( 1H1,15X,'EXECUTION TERMINATED DUE TO BLANK CARD IN INPUT',00319800
                 1/,16X,'IF ALL BATCHES HAVE BEEN RUN THIS IS A NORMAL TERMINATION.'00319900
                 2,/, 16X,'IF NOT - NOT.' /// )                                     00320000
ISN 0149        6 FORMAT(/// 16X,'END OF SES INPUT VERIFICATION.',                 00320100
                 1  I4,' ERRORS WERE FOUND.' )                                      00320200
ISN 0150        7 FORMAT(1H0,15X,'EXECUTION OF THIS SUBWAY ENVIRONMENT SIMULATION HA00320300
                 1S BEEN SUPRESSED AT THE USER''S OPTION.' )                        00320400
ISN 0151        8 FORMAT(1H0,15X,'EXECUTION OF THIS SUBWAY ENVIRONMENT SIMULATION HA00320500
                 1S BEEN SUPRESSED BY INPUT ERRORS.' )                              00320600
ISN 0152        9 FORMAT(1H0,15X,'EXECUTION OF THIS SUBWAY ENVIRONMENT SIMULATION IS00320700
                 1 TO PROCEED.')                                                    00320800
            C*****FORTRAN LOGICAL UNIT NUMBER OF INPUT DEVICE                       00320900
ISN 0153          IN = 5                                                            00321000
            C*****FORTRAN LOGICAL UNIT NUMBER OF OUTPUT DEVICE                      00321100
ISN 0154          OUT = 6                                                           00321200
            C*****LOAD SLASH AND BLANK INTO COMMON SINCE THEY ARE DEFINED BY A      00321300
            C*****DATA STATEMENT                                                    00321400
ISN 0155          SLASH = SLASH2                                                    00321500
ISN 0156          BLANK = BLANK2                                                    00321600
            C                                                                       00321700
            C*****CERTAIN PHYSICAL CONSTANTS - DEFINED                              00321800
            C                                                                       00321900
            C*****ABSOLUTE TEMPERATURE CONVERSION CONSTANT  DEG F TO DEG R          00322000
ISN 0157          ABTEMP=459.67                                                     00322100
            C*****CONVERSION FROM BTU TO FT-LBS - (FT-LB)/BTU                       00322200
ISN 0158          BTUFLB=778.0                                                      00322300
            C*****SPECIFIC HEAT OF AIR  BTU/(SLUG-DEG F)                            00322400
ISN 0159          CP=7.728                                                          00322500
            C*****CONVERSION FROM FT-LBS TO HP - HP/(FT-LB)                         00322600
ISN 0160          FLBHP=1.0/550.0                                                   00322700
            C*****CONVERSION FROM FEET TO INCHES - INCHES/FT                        00322800
ISN 0161          FTIN=12.0                                                         00322900
            C*****ACCELERATION CAUSED BY GRAVITY  FT/(SEC**2)                       00323000
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ISN 0162          GRACC=32.2                                                  00323100
            C*****HEAT OF VAPORIZATION OF WATER - BTU/(LB OF H2O VAPORIZED)    00323200
ISN 0163          HVH2O=1050.0                                                00323300
            C*****CONVERSION OF MILES/HOUR TO FEET/SECOND - ((FT-HR)/(MILES-SEC))  00323400
ISN 0164          MPHFPS=88.0/60.0                                            00323500
            C*****RATIO OF CIRCUMFERENCE OF A CIRCLE TO ITS DIAMETER           00323600
ISN 0165          PI = 3.14159265                                             00323700
            C*****GAS CONSTANT FOR DRY AIR - ((FT/SEC)**2)/DEG R               00323800
ISN 0166          PDRYAR=53.34                                                00323900
            C*****CONVERSION OF STANDARD ATMOSPHERE TO IN. HG. - (IN. HG.)/(S.A.)  00324000
ISN 0167          SAINHG=29.921                                               00324100
            C*****CONVERSION OF STANDARD ATMOSPHERE TO LBS/SQ IN - LBS/(SQ IN-S.A.) 00324200
ISN 0168          SAPSI=14.696                                                00324300
            C*****STEFAN-BOLTZMAN CONSTANT - BTU/(HR*FT*FT*(DEG R**4))         00324400
ISN 0169          STEFAN=1.714E-09                                            00324500
            C*****THERMAL CONDUCTIVITY OF AIR  BTU/(FT-SEC-DEG F)              00324600
ISN 0170          THCON=4.27777778E-06                                        00324700
            C*****CONVERSION FROM TONS WEIGHT TO LBS - LBS/TON                 00324800
ISN 0171          TONLB=2000.0                                                00324900
            C*****ABSOLUTE VISCOSITY OF AIR  SLUG/(FT-SEC)                     00325000
ISN 0172          VISAIR=0.399E-06                                            00325100
            C*****WATER GUAGE PRESSURE CONVERSION CONSTANT - (LBS H2O)/(FT*FT*IN)  00325200
ISN 0173          WGCONS=5.2                                                  00325300
            C*****CONVERSION FROM WATTS TO BTU/SEC - BTU/(WATT-SEC)            00325400
ISN 0174          WTBTUS=9.4866E-04                                           00325500
            C                                                                 00325600
            C*****CERTAIN PHYSICAL CONTANTS - COMPUTED                         00325700
            C                                                                 00325800
            C*****CONVERSION FROM FT-LBS TO BTU - BTU/(FT-LB)                  00325900
ISN 0175          FLBBTU=1.0/BTUFLB                                           00326000
            C*****CONVERSION OF FEET/SECOND TO MILES/HOUR - ((MILES-SEC)/(FT-HR))  00326100
ISN 0176          FPSMPH=1.0/MPHFPS                                           00326200
            C*****PRANDTL NUMBER FOR AIR - PR EQUALS ABOUT 0.72081             00326300
            C*****                         PR**0.6 EQUALS ABOUT 0.82166        00326400
ISN 0177          PR=CP*VISAIR/THCON                                          00326500
            C                                                                 00326600
            C****  ARRAY SIZE LIMITS       ****************************************  00326700
            C                                                                 00326800
ISN 0178          LMBLP  = 1000                                               00326900
ISN 0179          LMCLST = 30                                                 00327000
ISN 0180          LMCOND = 950                                                00327100
ISN 0181          LMEQRM = 120                                                00327200
ISN 0182          LMEXPD = 201                                                00327300
ISN 0183          LMFNTP = 4                                                  00327400
ISN 0184          LMLPK  = 225                                                00327500
ISN 0185          LMLPLK = 420                                                00327600
ISN 0186          LMLSEG = 90                                                 00327700
ISN 0187          LMLSS  = 250                                                00327800
ISN 0188          LMNLOP = 75                                                 00327900
ISN 0189          LMNODE = 130                                                00328000
ISN 0190          LMNODX = 400                                                00328100
ISN 0191          LMPRGP = 15                                                 00328200
ISN 0192          LMSCND = 5                                                  00328300
ISN 0193          LMSCTX = 400                                                00328400
ISN 0194          LMSECT = 140                                                00328500
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ISN 0195          LMSS    = 300                                          00328600
ISN 0196          LMSSTN = 440                                           00328700
ISN 0197          LMTBL2 = 1500                                          00328800
ISN 0198          LMTHND = 140                                           00328900
ISN 0199          LMTRAN = 30                                            00329000
ISN 0200          LMTRGP = 15                                            00329100
ISN 0201          LMTRRT = 6                                             00329200
ISN 0202          LMTRSG = 8                                             00329300
ISN 0203          LMTRTP = 3                                             00329400
ISN 0204          LMTSRT = 260                                           00329500
ISN 0205          LMUL    = 10                                           00329600
ISN 0206          LMVSEG = 60                                            00329700
            C                                                            00329800
ISN 0207      200 WRITE( OUT,1)                                          00329900
ISN 0208      210 READ(IN,2) SYSTEM,DATE,IX                              00330000
ISN 0209          NUMY1 = 0                                              00330100
ISN 0210          NUMY2 = 0                                              00330200
ISN 0211          DO  250  I = 1,8                                       00330300
ISN 0212          IF(DATE(I).NE.BLANK) GO TO 230                         00330400 <--- C
ISN 0214      220 NUMY1 = NUMY1 + 1                                      00330500
ISN 0215          GO TO 250                                              00330600
ISN 0216      230 IF(DATE(I).NE.SLASH) GO TO 250                         00330700 <--- C
ISN 0218      240 NUMY2 = NUMY2 + 1                                      00330800
ISN 0219      250 CONTINUE                                               00330900
ISN 0220          IF( NUMY2 - 2 ) 260,290,290                            00331000
ISN 0221      260 IF( NUMY1 - 8 ) 280,265,265                            00331100
ISN 0222      265 DO  270  I=1,18                                        00331200
ISN 0223          IF(SYSTEM(I).NE.BLANK) GO TO 280                       00331300 <--- C
ISN 0225      270 CONTINUE                                               00331400
ISN 0226          IF(IX.EQ.BLANK) GO TO 285                              00331500 <--- C
ISN 0228      280 WRITE(OUT,3) SYSTEM,DATE,IX                            00331600
ISN 0229          GO TO 210                                              00331700
            C*****BLANK CARD WAS FOUND - END OF DATA DECKS               00331800
ISN 0230      285 WRITE(OUT,4)                                           00331900
ISN 0231          STOP                                                   00332000
            C*****2 SLASHES FOUND IN CARD COLUMNS 70-78 - BEGINNING OF NEW DATA DECK00332100
ISN 0232      290 NEW = 2                                                00332200
            C*****CALL TO SUBROUTINE 'ALCHAR' IS NECESSARY TO LOAD PROPER OVERLAY  00332300
            C*****BLOCK TO PROVIDE LINKAGE TO THE OVERLAYS CONTAINING SUBROUTINES  00332400
            C*****'INPUT' AND 'SIMLAT'.                                  00332500
ISN 0233          CALL ALCHAR( 1, ICHAR )                                00332600
            C                                                            00332700
            C*****SES INPUT VERIFICATION                                 00332800
            C                                                            00332900
ISN 0234          CALL INPUT                                             00333000
            C*****END OF INPUT VERIFICATION - IF FATAL ERROR HAS OCCURRED GO TO    00333100
            C*****INITIAL INPUT PHASE OF PROGRAM                         00333200
ISN 0235          GO TO( 200,300), NEW                                   00333300
ISN 0236      300 NUMY1 = IABS( LIFE )                                   00333400
ISN 0237          WRITE(OUT,6) NUMY1                                     00333500
ISN 0238          IF( LIFE + DEATH ) 302,350,350                         00333600
ISN 0239      302 IF( DEATH ) 303,304,304                                00333700
ISN 0240      303 WRITE(OUT,7)                                           00333800
ISN 0241          GO TO 200                                              00333900
ISN 0242      304 WRITE(OUT,8)                                           00334000
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January 21, 1977

SUBWAY ENVIRONMENT SIMULATION (SES) COMPUTER PROGRAM

REVISION NO. 8 TO VERSION 2

Problem

The air pressure change in a line segment, which contributes to both the airflows and the train drag, was sometimes being computed incorrectly. The error occurred in line segments that were in line sections having more than one line segment. It did not occur in the last line segment of a line section. The error only could occur for a line segment if its line section had trains in it. For these possibilities the error consisted of the previous value for the change in air pressure over the end of a train being added at the end of a line segment when a zero value should have been added.

Symptoms

The airflows computed by the first step of the aerodynamic subprogram, which is at simulation time 0.0 seconds, were very large: about 10^{25} CFM. This caused a program halt during the second step of the program, which for the problem under consideration, occurrred at simulation time 0.1 seconds. This failure occurred because the "previous value" mentioned above had an extremely large value at 0.0 seconds since it had not yet been set to a value by the program. Most input data files had caused the program to set the value before attempting to use it, thus eliminating the symptom but not the problem.

Correction

See the attached partial listings of Subroutines INPUT and OMEGA2. Changed lines are indicated by a "C."

Effect on Previous Results

This problem is system dependent. It is recommended that the user check the impact on his previous results by rerunning one or more data sets whose aerodynamic parameters are typical for his system.

SUBROUTINE INPUT

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                 2 4HAUGU,4HST  ,4HSEPT,4H.   ,4HOCTO,4HBER ,4HNOVE,4HMBER,          01055400
                 3 4HDECE,4HMBER /                                                    01055500
ISN 0150     10   FORMAT (1H1,8A1,8X,'SES',10X,17A4,A2,9X,'PAGE',/,115X,'------')    01055600
ISN 0151     20   FORMAT (17A4,A2)                                                   01055700
ISN 0152     30   FORMAT (8F10.2)                                                    01055800
ISN 0153     40   FORMAT (9A4,4X,4F10.2)                                             01055900
ISN 0154     50   FORMAT (1H1,4(/),T30,'DEPARTMENT OF TRANSPORTATION / TRANSPORTATI01056000
                 1N SYSTEMS CENTER',5(/),T49,5('X'),3X,7('X'),3X,5('X'),/,T48,'X',T501056100
                 27,'X',T66,'X',/,T49,5('X'),T57,5('X'),T67,5('X'),/,T54,'X',T57,'X'01056200
                 3,T72,'X',/,T54,'X',T57,'X',T72,'X',/,T49,6('X'),T57,7('X'),T66,6('01056300
                 4X'),///,T46,'SUBWAY ENVIRONMENT SIMULATION',6(/))                  01056400
ISN 0155     60   FORMAT (1H ,T52,'SIMULATION OF',////,25X,17A4,A2////25X,17A4,A2///01056500
                 1/)                                                                01056600
ISN 0156     70   FORMAT (25X,17A4,A2,////)                                          01056700
ISN 0157     80   FORMAT (1H ,36X,'DESIGN TIME',I5,' HRS',3X,2A4,I6,///)            01056800
ISN 0158     90   FORMAT (1H ,38X,'DESIGN TIME 0',I3,' HRS',3X,2A4,I6,/)             01056900
ISN 0159    100   FORMAT (1H ,56X,8A1,//T95,'PREPARED BY -'//,T97,'PARSONS, BRINCKER01057000
                 1HOFF,',/,T97,'QUADE AND DOUGLAS, INC.',/,T97,'NEW YORK, NEW YORK',01057100
                 2/,T97,'VERSION 2.08')                                             01057200
ISN 0160    110   FORMAT (1H0,T45,'INPUT VERIFICATION OF GENERAL DATA')              01057300
ISN 0161    120   FORMAT (1H0,T113,'FORM 1C'/T30,'TRAIN PERFORMANCE OPTION',T80,I5,T01057400
                 190,'BYPASS')                                                      01057500
ISN 0162    130   FORMAT (1H0,T113,'FORM 1C'/T30,'TRAIN PERFORMANCE OPTION',T80,I5,T01057600
                 190,'IMPLICIT')                                                    01057700
ISN 0163    140   FORMAT (1H0,T113,'FORM 1C'/T30,'TRAIN PERFORMANCE OPTION',T80,I5,T01057800
                 190,'EXPLICIT (HEAT REJ. COMPUTED)')                               01057900
ISN 0164    150   FORMAT (1H0,T113,'FORM 1C'/T30,'TRAIN PERFORMANCE OPTION',T80,I5,T01058000
                 190,'EXPLICIT (HEAT REJ. INPUT)')                                  01058100
ISN 0165    160   FORMAT (1H0,T30,'TEMPERATURE / HUMIDITY SIMULATION OPTION',T80,I5,01058200
                 1T90,'BYPASS')                                                     01058300
ISN 0166    170   FORMAT (1H0,T30,'TEMPERATURE / HUMIDITY SIMULATION OPTION',T80,I5,01058400
                 1T90,'YES')                                                        01058500
ISN 0167    180   FORMAT (1H0,T30,'TEMPERATURE / HUMIDITY SIMULATION OPTION',T80,I5,01058600
                 1T90,'YES - EVAPORATION')                                          01058700
ISN 0168    190   FORMAT (1H0,T30,'HUMIDITY DISPLAY OPTION',T80,I5,T90,'HUMIDITY RAT01058800
                 1IO')                                                              01058900
ISN 0169    200   FORMAT (1H0,T30,'HUMIDITY DISPLAY OPTION',T80,I5,T90,'WET-BULB TEM01059000
                 1PERATURE')                                                        01059100
ISN 0170    210   FORMAT (1H0,T30,'HUMIDITY DISPLAY OPTION',T80,I5,T90,'RELATIVE HUM01059200
                 1IDITY')                                                           01059300
ISN 0171    220   FORMAT (1H0,T30,'ENVIRONMENTAL CONTROL LOAD EVALUATION OPTION',T801059400
                 1,I5,T90,'BYPASS')                                                 01059500
ISN 0172    230   FORMAT (1H0,T30,'ENVIRONMENTAL CONTROL LOAD EVALUATION OPTION',T30C1059600
                 1,I5,T90,'YES')                                                    01059700
ISN 0173    240   FORMAT (1H0,T30,'ENVIRONMENTAL CONTROL LOAD EVALUATION OPTION',T80C1059800
                 1,I5,T90,'OFF-HOUR')                                               01059900
ISN 0174    250   FORMAT (1H0,T30,'HEAT SINK SUMMARY PRINT OPTION',T80,I5,T90,'BYPAS01060000
                 1S')                                                               01060100
ISN 0175    260   FORMAT (1H0,T30,'HEAT SINK SUMMARY PRINT OPTION',T80,I5,T90,'YES')01060200
ISN 0176    270   FORMAT (1H0,T30,'SUPPLEMENTARY OUTPUT OPTION',T80,I5)             01060300
ISN 0177    280   FORMAT (1H0,T30,'ALLOWABLE SIMULATION ERRORS',T80,I5)             01060400
ISN 0178    290   FORMAT (1H0,T30,'ALLOWABLE INPUT ERRORS',T80,I5)                  01060500
ISN 0179    300   FORMAT (1H0,T30,'ALLOWABLE INPUT ERRORS',T80,I5,T90,'NO SIMULATION01060600
                 1')                                                                01060700
ISN 0180    310   FORMAT (/1H0,T30,'NUMBER OF LINE SEGMENTS',T80,I5,T113,'FORM 1D') 01060800
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C

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ISN 0289          IF (TRLIST(IT)) 440,470,440                                01644200
            C*****TRAIN NUMBER                                               01644300
ISN 0290    440   NUMV=TCNNLS(ILS,IT)                                        01644400
ISN 0291          NUMV=IABS(NUMV)                                            01644500
            C*****TRAIN TYPE                                                 01644600
ISN 0292          ITYP=ITYPV(NUMV)                                           01644700
            C*****AIR VELOCITY IN REGION RELATIVE TO TRAIN                   01644800
ISN 0293          VRVRG=VNETRG-TRLIST(IT)*UV(NUMV)                           01644900
            C*****ABSOLUTE AIR VELOCITY IN REGION RELATIVE TO TRAIN          01645000
ISN 0294          ABVVRG=ABS(VRVRG)                                          01645100
            C*****COMPUTE (TRAIN SKIN VISCOUS FORCE/AIR MASS DENSITY)        01645200
ISN 0295          SUM7A=-LAMDAV(ITYP)*LRG*VRVRG*ABVVRG/8.0                   01645300
            C*****CHECK FOR NECESSITY OF TRAIN DRAG COMPUTATION - SEE DEFINITION OF 01645400
            C*****KAERO IN DICTIONARY OF VARIABLES FOR PHILOSOPHY BEHIND THIS 01645500
ISN 0296          IF (KAERO) 460,450,460                                     01645600
            C*****ADD TRAIN HEAD CHANGE CAUSED BY TRAIN SKIN VISCOUS FORCE TO TOTAL 01645700
            C*****TRAIN HEAD CHANGE. ADD ESTIMATED TRAIN HEAD CHANGE CAUSED BY 01645800
            C*****AIRFLOW ACCELERATION TO TOTAL TRAIN HEAD CHANGE USING PREVIOUSLY 01645900
            C*****KNOWN VALUE OF AIRFLOW ACCELERATION.                       01646000
ISN 0297    450   DRAGV(NUMV)=DRAGV(NUMV)+TRLIST(IT)*(SUM7A/AV(ITYP)-LRG*DQDTS(ISCT)01646100
                 1/ANETRG)                                                   01646200
            C*****COMPUTE REGION VISCOUS HEAD CHANGE FOR FLOW AT PERIMETER OF ALL 01646300
            C*****TRAINS IN REGION BY ADDING COMPONENT FOR A TRAIN           01646400
ISN 0298    460   SUM7=SUM7+SUM7A/ANETRG                                     01646500
ISN 0299    470   CONTINUE                                                   01646600
ISN 0300          IF (AHTRRG) 610,480,610                                    01646700
            C*****HEAD CHANGES AT FRONT END OF LINE SEGMENT - ONLY COMPUTED IF FRONT01646800
            C*****END OF REGION IS FRONT END OF LINE SEGMENT - OTHERWISE ZERO 01646900
ISN 0301    480   SUM8=-VNETRG*(CFPLS(ILS)*(VNETRG+ABVNRG)-CFNLS(ILS)*(VNETRG-ABVNRG01647000
                 1))/4.0                                                     01647100
            C*****SET HEAD CHANGE AT FORWARD END OF REGION CAUSED BY END OF TRAIN 01647200 ←— C
            C*****TO ZERO                                                    01647300 ←— C
ISN 0302          SUM9=0.0                                                   01647400 ←— C
ISN 0303          IF (ILS-NHIGHS) 720,490,720                                01647500 ←— C
            C*****STORE AIR VELOCITY AND AREA AT FORWARD END OF SECTION FOR LATER 01647600
            C*****USE BY JUNCTION SUBROUTINES                                01647700
ISN 0304    490   VHIGHS(ISCT)=VNETRG                                        01647800 ←— C
ISN 0305          AHIGHS(ISCT)=ANETRG                                        01647900
            C*****COMPUTATION AND STORAGE OF TRAIN-AT-NODE DATA FOR USE BY JUNCTION 01648000
            C*****SUBROUTINES - COMPUTED ONLY FOR MULTIPLY BRANCHED JUNCTIONS 01648100
            C*****FIND NUMBER OF NODE AT FORWARD END OF SEGMENT              01648200
ISN 0306          IF(KAERO) 720,495,720                                      01648300
ISN 0307    495   INODE=TABL13(ISCT)                                         01648400
            C*****FIND RANGE OF LOCATIONS IN ARRAY TABL2 WHERE NODE DATA IS STORED 01648500
ISN 0308          NLOW=TABL1(INODE)                                          01648600
ISN 0309          NHIGH=TABL1(INODE+1)-1                                     01648700
            C*****CHECK IF NODE IS A MULTIPLY BRANCHED JUNCTION              01648800
ISN 0310          IF (NHIGH-NLOW) 720,500,500                                01648900
            C*****NODE IS A MULTIPLY BRANCHED JUNCTION. COMPUTE LOWER RANGE OF 01649000
            C*****LOCATIONS OF TRAIN-AT-NODE DATA IN ARRAY TABL2 (UPPER RANGE 01649100
            C*****IS THE SAME). FOR EACH NODE THAT IS A MULTIPLY BRANCHED JUNCTION 01649200
            C*****THE TRAIN-AT-NODE DATA IS STORED IN THE UPPER 3*LMTRRT LOCATIONS 01649300
            C*****OF THE PORTION OF ARRAY TABL2 SET ASIDE FOR THIS NODE. IF NODE 01649400
            C*****INODE IS A MULTIPLY BRANCHED JUNCTION THEN THE NODE-AT-TRAIN DATA 01649500
            C*****IS STORED IN ARRAY TABL2 FROM TABL1(INODE+1)-3*LMTRRT TO   01649600
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SES SAMPLE PROBLEM

SAMPL 5

REVISED OUTPUT REFLECTING
REVISIONS THROUGH V2M08

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(TUNNEL) WEST PORTAL TO 1100 FT - ROUTE 1 FROM NODE 1 TO NODE 3

LENGTH 100.0 FT
AREA 300.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	1 - 1	585729.	930.0	95632.	906.0	200452.	0.
AIR VELOCITY	(FPM)	1 - 1	1952.	930.0	319.	906.0	668.	0.
AIR FLOW DIRECTION	(PERCENT)	1 - 1					100.0	0.0
DRY-BULB TEMPERATURE	(DEG F)	1 - 1 - 1	85.7	930.0	81.8	922.0	82.1	0.0
HUMIDITY RATIO	(LB/LB)	1 - 1 - 1	0.0165	900.0	0.0165	900.0	0.0165	

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	76091.3	BTU/HR
STEADY-STATE HEAT SOURCES	700.0	BTU/HR
HEAT SINK	-43513.5	BTU/HR

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(TUNNEL) WEST PORTAL TO 1100 FT - ROUTE 1 FROM NODE 1 TO NODE 3

LENGTH 100.0 FT
AREA 300.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	1 - 1	585729.	930.0	95632.	906.0	200452.	0.
AIR VELOCITY	(FPM)	1 - 1	1952.	930.0	319.	906.0	668.	0.
AIR FLOW DIRECTION	(PERCENT)	1 - 1					100.0	0.0
DRY-BULB TEMPERATURE	(DEG F)	1 - 1 - 1	85.7	930.0	81.8	922.0	82.1	0.0
HUMIDITY RATIO	(LB/LB)	1 - 1 - 1	0.0165	900.0	0.0165	900.0	0.0165	

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	76091.3	BTU/HR
STEADY-STATE HEAT SOURCES	700.0	BTU/HR
HEAT SINK	-43513.5	BTU/HR

100.0 I - I (STATION) START OF STATION TO WEST STAIRWAY

01/07/77 SES SES USER'S MANUAL SAMPLE PROBLEM 5 - AIR-CONDITIONED STATION-OFF HOUR PAGE

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(TUNNEL) 1100 TO 1200 FT - ROUTE 1 FROM NODE 1 TO NODE 3 .

LENGTH 100.0 FT
AREA 250.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	1 - 2	585729.	930.0	95632.	906.0	200452.	0.
AIR VELOCITY	(FPM)	1 - 2	2343.	930.0	383.	906.0	802.	0.
AIR FLOW DIRECTION	(PERCENT)	1 - 2					100.0	0.0
DRY-BULB TEMPERATURE	(DEG F)	1 - 2 - 1	86.8	930.0	81.6	923.0	82.1	0.0
HUMIDITY RATIO	(LB/LB)	1 - 2 - 1	0.0165	900.0	0.0165	900.0	0.0165	

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	74028.1	BTU/HR
STEADY-STATE HEAT SOURCES	700.0	BTU/HR
HEAT SINK	-47748.7	BTU/HR

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(TUNNEL) 1200 TO 1600 FT - ROUTE 1 FROM NODE 1 TO NODE 3

LENGTH 400.0 FT
AREA 225.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	1 - 3	585729.	930.0	95632.	906.0	200452.	0.
AIR VELOCITY	(FPM)	1 - 3	2603.	930.0	425.	906.0	891.	0.
AIR FLOW DIRECTION	(PERCENT)	1 - 3					100.0	0.0
DRY-BULB TEMPERATURE	(DEG F)	1 - 3 - 1	88.0	932.0	81.3	924.0	82.4	0.0
		1 - 3 - 2	87.9	935.0	81.1	926.0	82.7	0.0
HUMIDITY RATIO	(LB/LB)	1 - 3 - 1	0.0165	900.0	0.0165	900.0	0.0165	
		1 - 3 - 2	0.0165	900.0	0.0165	936.0	0.0165	

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	299351.5	BTU/HR
STEADY-STATE HEAT SOURCES	2800.0	BTU/HR
HEAT SINK	-216430.1	BTU/HR

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(TUNNEL) PORTAL TO 1600 FT - ROUTE 2 FROM NODE 2 TO NODE 4

LENGTH 600.0 FT
AREA 225.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	2 - 4	-81995.	928.0	-584012.	960.0	0.	-222926.
AIR VELOCITY	(FPM)	2 - 4	-364.	928.0	-2596.	960.0	0.	-991.
AIR FLOW DIRECTION	(PERCENT)	2 - 4					0.0	100.0
DRY-BULB TEMPERATURE	(DEG F)	2 - 4 - 1	88.7	964.0	81.9	956.0	0.0	84.1
		2 - 4 - 2	89.3	962.0	81.8	954.0	0.0	83.8
		2 - 4 - 3	88.8	960.0	81.7	951.0	0.0	83.5
HUMIDITY RATIO	(LB/LB)	2 - 4 - 1	0.0159	966.0	0.0158	961.0	0.0159	
		2 - 4 - 2	0.0159	936.0	0.0157	961.0	0.0159	
		2 - 4 - 3	0.0161	928.0	0.0156	952.0	0.0158	

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	500405.9	BTU/HR
STEADY-STATE HEAT SOURCES	61199.9	BTU/HR
HEAT SINK	-482663.1	BTU/HR

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(VENTILATION SHAFT) VENT SHAFT AT 1600 FT - ROUTE 1 FROM NODE 3 TO NODE 50

LENGTH 110.0 FT
AREA 200.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	3 -103	292731.	929.0	-127742.	937.0	25120.	-44129.
AIR VELOCITY	(FPM)	3 -103	1464.	929.0	-639.	937.0	126.	-221.
AIR FLOW DIRECTION	(PERCENT)	3 -103					37.4	62.6
PERCENTAGE OF TIME OUTFLOW VELOCITY EXCEEDS 1000.0 FPM		3 -103					6.6	
DRY-BULB TEMPERATURE	(DEG F)	3 -103 - 1	81.8	968.0	81.4	931.0	81.6	81.7
HUMIDITY RATIO	(LB/LB)	3 -103 - 1	0.0165	965.0	0.0165	932.0	0.0165	

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(VENTILATION SHAFT) VENT SHAFT AT 1600 FT - ROUTE 2 FROM NODE 4 TO NODE 51

LENGTH 95.1 FT
AREA 132.7 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	4 -104	136195.	952.0	-299697.	960.0	13740.	-61204.
AIR VELOCITY	(FPM)	4 -104	1026.	952.0	-2258.	960.0	104.	-461.
AIR FLOW DIRECTION	(PERCENT)	4 -104					25.3	74.7
PERCENTAGE OF TIME OUTFLOW VELOCITY EXCEEDS 1000.0 FPM		4 -104					9.9	
DRY-BULB TEMPERATURE	(DEG F)	4 -104 - 1	81.8	965.0	81.6	950.0	81.7	81.8
HUMIDITY RATIO	(LB/LB)	4 -104 - 1	0.0165	931.0	0.0156	952.0	0.0163	

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(TUNNEL) 1600 TO 2200 FT(START OF STA) -RTE 1 FROM NODE 3 TO NODE 5

LENGTH 600.0 FT
AREA 225.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	5 - 5	499096.	935.0	63238.	983.0	219461.	0.
AIR VELOCITY	(FPM)	5 - 5	2218.	935.0	281.	983.0	975.	0.
AIR FLOW DIRECTION	(PERCENT)	5 - 5					100.0	0.0
DRY-BULB TEMPERATURE	(DEG F)	5 - 5 - 1	87.6	938.0	81.1	929.0	82.7	0.0
		5 - 5 - 2	89.0	940.0	81.0	931.0	83.1	0.0
		5 - 5 - 3	90.4	944.0	81.0	933.0	83.7	0.0
HUMIDITY RATIO	(LB/LB)	5 - 5 - 1	0.0165	955.0	0.0165	900.0	0.0165	
		5 - 5 - 2	0.0165	965.0	0.0165	900.0	0.0165	
		5 - 5 - 3	0.0165	953.0	0.0165	900.0	0.0165	

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	562443.3	BTU/HR
STEADY-STATE HEAT SOURCES	4200.0	BTU/HR
HEAT SINK	-418640.4	BTU/HR

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(TUNNEL) 1600 TO 2200 FT(START OF STA)- RTE 2 FROM NODE 4 TO NODE 5

LENGTH 600.0 FT
AREA 225.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	6 - 6	-332.	920.0	-348721.	952.0	0.	-175462.
AIR VELOCITY	(FPM)	6 - 6	-1.	920.0	-1550.	952.0	0.	-780.
AIR FLOW DIRECTION	(PERCENT)	6 - 6					0.0	100.0
DRY-BULB TEMPERATURE	(DEG F)	6 - 6 - 1	88.3	958.0	81.5	947.0	0.0	93.7
		6 - 6 - 2	89.5	956.0	81.2	941.0	0.0	93.3
		6 - 6 - 3	89.9	952.0	80.7	904.0	0.0	82.9
HUMIDITY RATIO	(LB/LB)	6 - 6 - 1	0.0159	977.0	0.0153	943.0	0.0155	
		6 - 6 - 2	0.0160	971.0	0.0151	910.0	0.0154	
		6 - 6 - 3	0.0162	967.0	0.0147	901.0	0.0154	

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	623324.1	BTU/HR
STEADY-STATE HEAT SOURCES	61199.9	BTU/HR
HEAT SINK	-419551.7	BTU/HR

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(STATION) START OF STATION TO WEST STAIRWAY FROM NODE 5 TO NODE 6

LENGTH 100.0 FT
AREA 700.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	7 - 7	362535.	934.0	-184908.	977.0	89457.	-45458.
AIR VELOCITY	(FPM)	7 - 7	518.	934.0	-264.	977.0	128.	-65.
AIR FLOW DIRECTION	(PERCENT)	7 - 7					49.5	50.5
DRY-BULB TEMPERATURE	(DEG F)	7 - 7 - 1	84.5	952.0	76.6	913.0	78.6	80.5
HUMIDITY RATIO	(LB/LB)	7 - 7 - 1	0.0149	952.0	0.0127	911.0	0.0138	

PERCENTAGE OF TIME TEMPERATURE IS ABOVE

	70.0	75.0	80.0	85.0	90.0	95.0
7 - 7 - 1	100.0	100.0	38.5	0.0	0.0	0.0

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	693411.1	BTU/HR
STEADY-STATE HEAT SOURCES	70000.4	BTU/HR
ENVIRONMENTAL CONTROL SYSTEM	-1230098.0	BTU/HR
HEAT SINK	-4038.2	BTU/HR
UNDERPLATFORM EXHAUST SYSTEM	0.0	BTU/HR

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(STATION) WEST END OF MEZZANINE TO STREET EXIT FROM NODE 6 TO NODE 7

LENGTH 200.0 FT
AREA 450.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	8 - 8	97515.	932.0	-102979.	950.0	17589.	-19199.
AIR VELOCITY	(FPM)	8 - 8	217.	932.0	-229.	950.0	39.	-43.
AIR FLOW DIRECTION	(PERCENT)	8 - 8					56.0	44.0
DRY-BULB TEMPERATURE	(DEG F)	8 - 8 - 1	80.1	908.0	79.5	940.0	79.9	79.8
		8 - 8 - 2	80.6	964.0	80.1	942.0	80.4	80.4
HUMIDITY RATIO	(LB/LB)	8 - 8 - 1	0.0141	965.0	0.0140	929.0	0.0141	
		8 - 8 - 2	0.0145	964.0	0.0138	942.0	0.0141	

PERCENTAGE OF TIME TEMPERATURE IS ABOVE

	70.0	75.0	80.0	85.0	90.0	95.0
8 - 8 - 1	100.0	100.0	30.8	0.0	0.0	0.0
8 - 8 - 2	100.0	100.0	100.0	0.0	0.0	0.0

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	4.2	BTU/HR
STEADY-STATE HEAT SOURCES	99999.9	BTU/HR
ENVIRONMENTAL CONTROL SYSTEM	-102104.9	BTU/HR
HEAT SINK	-5998.0	BTU/HR
UNDERPLATFORM EXHAUST SYSTEM	0.0	BTU/HR

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(STATION) PLATFORM AREA BETWEEN STAIRWAYS FROM NODE 6 TO NODE 8

LENGTH 400.0 FT
AREA 700.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	9 - 9	280988.	935.0	-241894.	982.0	92016.	-46407.
AIR VELOCITY	(FPM)	9 - 9	401.	935.0	-346.	982.0	131.	-66.
AIR FLOW DIRECTION	(PERCENT)	9 - 9					67.0	33.0
DRY-BULB TEMPERATURE	(DEG F)	9 - 9 - 1	81.5	950.0	77.8	935.0	79.6	80.1
		9 - 9 - 2	81.1	905.0	78.3	940.0	79.9	79.6
		9 - 9 - 3	81.2	907.0	77.8	990.0	79.9	78.8
		9 - 9 - 4	82.1	909.0	77.0	978.0	79.8	78.0
HUMIDITY RATIO	(LB/LB)	9 - 9 - 1	0.0143	950.0	0.0137	925.0	0.0141	
		9 - 9 - 2	0.0142	967.0	0.0139	934.0	0.0141	
		9 - 9 - 3	0.0140	969.0	0.0139	907.0	0.0140	
		9 - 9 - 4	0.0140	967.0	0.0139	904.0	0.0140	

PERCENTAGE OF TIME TEMPERATURE IS ABOVE

	70.0	75.0	80.0	85.0	90.0	95.0
9 - 9 - 1	100.0	100.0	49.5	0.0	0.0	0.0
9 - 9 - 2	100.0	100.0	46.2	0.0	0.0	0.0
9 - 9 - 3	100.0	100.0	29.7	0.0	0.0	0.0
9 - 9 - 4	100.0	100.0	34.1	0.0	0.0	0.0

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	3416520.0	BTU/HR
STEADY-STATE HEAT SOURCES	275999.7	BTU/HR
ENVIRONMENTAL CONTROL SYSTEM	-3546868.0	BTU/HR
HEAT SINK	-23453.2	BTU/HR
UNDERPLATFORM EXHAUST SYSTEM	0.0	BTU/HR

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(STAIRWAY) STREET LEVEL STAIRWAY TO MEZZANINE FROM NODE 7 TO NODE 52 .

LENGTH 20.0 FT
AREA 96.5 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	10 -110	130547.	932.0	-105933.	949.0	27692.	-35055.
AIR VELOCITY	(FPM)	10 -110	1353.	932.0	-1098.	949.0	287.	-363.
AIR FLOW DIRECTION	(PERCENT)	10 -110					39.6	60.4
PERCENTAGE OF TIME OUTFLOW VELOCITY EXCEEDS 1000.0 FPM		10 -110					12.1	
DRY-BULB TEMPERATURE	(DEG F)	10 -110 - 1	81.9	915.0	80.1	978.0	80.5	81.6
HUMIDITY RATIO	(LB/LB)	10 -110 - 1	0.0165	921.0	0.0138	940.0	0.0154	

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(STATION) STREET EXIT TO EAST END OF MEZZANINE FROM NODE 7 TO NODE 8

LENGTH 200.0 FT
AREA 450.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	11 - 10	95729.	909.0	-109030.	969.0	21458.	-15705.
AIR VELOCITY	(FPM)	11 - 10	213.	909.0	-242.	969.0	48.	-35.
AIR FLOW DIRECTION	(PERCENT)	11 - 10					61.5	38.5
DRY-BULB TEMPERATURE	(DEG F)	11 - 10 - 1	80.6	922.0	80.0	905.0	80.3	80.3
		11 - 10 - 2	80.2	963.0	79.1	979.0	79.8	79.6
HUMIDITY RATIO	(LB/LB)	11 - 10 - 1	0.0145	922.0	0.0137	905.0	0.0141	
		11 - 10 - 2	0.0140	964.0	0.0139	910.0	0.0140	

PERCENTAGE OF TIME TEMPERATURE IS ABOVE

	70.0	75.0	80.0	85.0	90.0	95.0
11 - 10 - 1	100.0	100.0	93.4	0.0	0.0	0.0
11 - 10 - 2	100.0	100.0	25.3	0.0	0.0	0.0

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	4.9	BTU/HR
STEADY-STATE HEAT SOURCES	99999.9	BTU/HR
ENVIRONMENTAL CONTROL SYSTEM	-94586.9	BTU/HR
HEAT SINK	-5197.9	BTU/HR
UNDERPLATFORM EXHAUST SYSTEM	0.0	BTU/HR

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(STATION) EAST STAIRWAY TO END OF STATION FROM NODE 8 TO NODE 9

LENGTH 100.0 FT
AREA 700.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	12 - 11	271237.	937.0	-262545.	973.0	105669.	-54307.
AIR VELOCITY	(FPM)	12 - 11	387.	937.0	-375.	973.0	151.	-78.
AIR FLOW DIRECTION	(PERCENT)	12 - 11					64.8	35.2
DRY-BULB TEMPERATURE	(DEG F)	12 - 11 - 1	85.2	910.0	75.9	966.0	80.2	78.1
HUMIDITY RATIO	(LB/LB)	12 - 11 - 1	0.0140	911.0	0.0138	900.0	0.0139	

PERCENTAGE OF TIME TEMPERATURE IS ABOVE

	70.0	75.0	80.0	85.0	90.0	95.0
12 - 11 - 1	100.0	100.0	39.6	3.3	0.0	0.0

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	719437.5	BTU/HR
STEADY-STATE HEAT SOURCES	69999.6	BTU/HR
ENVIRONMENTAL CONTROL SYSTEM	-1054050.0	BTU/HR
HEAT SINK	-14632.8	BTU/HR
UNDERPLATFORM EXHAUST SYSTEM	0.0	BTU/HR

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(TUNNEL) STATION END TO EXHAUST FAN AT 3300FT FROM NODE 9 TO NODE 10

LENGTH 500.0 FT
AREA 400.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	13 - 12	271237.	937.0	-262545.	973.0	105669.	-54307.
AIR VELOCITY	(FPM)	13 - 12	678.	937.0	-656.	973.0	264.	-136.
AIR FLOW DIRECTION	(PERCENT)	13 - 12					64.8	35.2
DRY-BULB TEMPERATURE	(DEG F)	13 - 12 - 1	90.6	911.0	80.3	963.0	84.6	83.4
		13 - 12 - 2	91.7	914.0	83.7	964.0	87.5	86.3
		13 - 12 - 3	91.8	916.0	86.5	964.0	89.2	88.5
HUMIDITY RATIO	(LB/LB)	13 - 12 - 1	0.0142	912.0	0.0140	963.0	0.0140	
		13 - 12 - 2	0.0147	914.0	0.0141	963.0	0.0143	
		13 - 12 - 3	0.0154	915.0	0.0144	963.0	0.0148	

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	1066610.0	BTU/HR
STEADY-STATE HEAT SOURCES	51000.0	BTU/HR
HEAT SINK	-358160.7	BTU/HR

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(VENTILATION SHAFT) FAN SHAFT AT 3300 FT - EXHAUST MODE FROM NODE 10 TO NODE 53

LENGTH 78.7 FT
AREA 150.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	14 -114	153791.	968.0	119234.	914.0	137545.	0.
AIR VELOCITY	(FPM)	14 -114	1025.	968.0	795.	914.0	919.	0.
AIR FLOW DIRECTION	(PERCENT)	14 -114					100.0	0.0
PERCENTAGE OF TIME OUTFLOW VELOCITY EXCEEDS 1000.0 FPM		14 -114					94.5	
DRY-BULB TEMPERATURE	(DEG F)	14 -114 - 1	90.5	926.0	87.5	952.0	88.9	0.0
HUMIDITY RATIO	(LB/LB)	14 -114 - 1	0.0160	905.0	0.0146	950.0	0.0154	

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(TUNNEL) EXHAUST FAN TO 3700 FT FROM NODE 10 TO NODE 11

LENGTH 400.0 FT
AREA 400.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	15 - 13	133181.	918.0	-391137.	972.0	33732.	-120315.
AIR VELOCITY	(FPM)	15 - 13	333.	918.0	-978.	972.0	84.	-301.
AIR FLOW DIRECTION	(PERCENT)	15 - 13					44.0	56.0
DRY-BULB TEMPERATURE	(DEG F)	15 - 13 - 1	91.2	976.0	88.3	909.0	89.7	89.3
		15 - 13 - 2	90.2	973.0	86.5	910.0	87.9	88.0
HUMIDITY RATIO	(LB/LB)	15 - 13 - 1	0.0162	916.0	0.0157	950.0	0.0160	
		15 - 13 - 2	0.0164	922.0	0.0162	972.0	0.0163	

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	673970.6	BTU/HR
STEADY-STATE HEAT SOURCES	40800.0	BTU/HR
HEAT SINK	-327793.4	BTU/HR

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(TUNNEL) 3700 FT TO EAST PORTAL AT 4000 FT FROM NODE 10 TO NODE 11

LENGTH 300.0 FT
AREA 700.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	15 - 14	133181.	918.0	-391137.	972.0	33732.	-120315.
AIR VELOCITY	(FPM)	15 - 14	190.	918.0	-559.	972.0	48.	-172.
AIR FLOW DIRECTION	(PERCENT)	15 - 14					44.0	56.0
DRY-BULB TEMPERATURE	(DEG F)	15 - 14 - 1	87.5	971.0	84.8	910.0	85.6	86.0
		15 - 14 - 2	85.7	969.0	83.0	910.0	83.9	84.1
HUMIDITY RATIO	(LB/LB)	15 - 14 - 1	0.0165	924.0	0.0164	971.0	0.0164	
		15 - 14 - 2	0.0165	925.0	0.0165	970.0	0.0165	

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	469402.1	BTU/HR
STEADY-STATE HEAT SOURCES	30600.0	BTU/HR
HEAT SINK	-128030.9	BTU/HR

SES HEAT SINK ANALYSIS

ZONE NUMBER 1

SYSTEM PARTITIONING	OFF HOUR AVERAGE AIR TEMPERATURE (DEG F)	OFF HOUR AVERAGE HUMIDITY RATIO (LB/LB)
1 - 1 - 1	82.1	0.01648
1 - 2 - 1	82.1	0.01648
1 - 3 - 1	82.3	0.01648
1 - 3 - 2	82.6	0.01648
2 - 4 - 1	83.9	0.01582
2 - 4 - 2	83.7	0.01582
2 - 4 - 3	83.4	0.01581
5 - 5 - 1	82.7	0.01648
5 - 5 - 2	83.1	0.01648
5 - 5 - 3	83.7	0.01648
6 - 6 - 1	83.7	0.01544
6 - 6 - 2	83.2	0.01532
6 - 6 - 3	82.9	0.01538
3 -103 - 1	81.6	0.01648
4 -104 - 1	81.8	0.01631

SES HEAT SINK ANALYSIS

ZONE NUMBER 3

SYSTEM PARTITIONING	OFF HOUR AVERAGE AIR TEMPERATURE (DEG F)	OFF HOUR AVERAGE HUMIDITY RATIO (LB/LB)
10 -110 - 1	81.0	0.01529

SES HEAT SINK ANALYSIS

ZONE NUMBER 4

SYSTEM PARTITIONING	OFF HOUR AVERAGE AIR TEMPERATURE (DEG F)	OFF HOUR AVERAGE HUMIDITY RATIO (LB/LB)
13 - 12 - 1	84.5	0.01387
13 - 12 - 2	87.2	0.01420
13 - 12 - 3	89.1	0.01479
15 - 13 - 1	89.4	0.01599
15 - 13 - 2	87.8	0.01634
15 - 14 - 1	85.8	0.01644
15 - 14 - 2	84.0	0.01647
14 -114 - 1	88.8	0.01537

ENVIRONMENTAL CONTROL SYSTEM LOAD ESTIMATES

AVERAGED SUBSEGMENT HEAT GAINS(+) OR LOSSES(-), BTU/HR

THE DESIGN PERIOD IS NEITHER MORNING NOR EVENING RUSH HOUR

---------- ZONE NUMBER 2 ----- DESIGN CONDITION ----- 80.0 DEG F DRY BULB ----- 70.0 DEG F WET BULB ----------

SYSTEM PARTITIONING	TRAINS		STEADY-STATE		HEAT SINK	AIR FLOW		ENVIRONMENTAL CONTROL		TOTAL ENVIRONMENTAL CONTROL REQUIREMENT		
	SENSIBLE	LATENT	SENSIBLE	LATENT	SENSIBLE	SENSIBLE	LATENT	SENSIBLE	LATENT	SENSIBLE	LATENT	TOTAL
7 - 7 - 1	693411	9	70000	35999	-10722	451074	1072160	-1230097	-1092677	-1203763	-1108148	-2311931
8 - 8 - 1	2	0	50000	36000	-2539	-6273	23772	-40950	-50936	-41140	-59772	-100912
8 - 8 - 2	2	0	50000	36000	-2729	28544	195697	-61153	-198436	-75817	-231697	-307514
9 - 9 - 1	844136	0	69000	36000	-11748	14217	70611	-871170	-67620	-915605	-106611	-1022216
9 - 9 - 2	857907	0	69000	36000	-11650	-51454	-22700	-849941	-8072	-863803	-13300	-877103
9 - 9 - 3	861544	0	69000	36000	-11507	-56972	-30930	-877203	-15624	-862065	-5070	-867135
9 - 9 - 4	852933	0	68999	36000	-11610	12841	-12224	-948551	-21201	-923163	-22776	-945939
11 - 10 - 1	2	0	50000	36000	-2746	27763	197066	-64513	-207444	-75019	-233066	-308085
11 - 10 - 2	2	0	50000	36000	-2572	-25839	-1153	-30072	-33191	-21591	-34847	-56438
12 - 11 - 1	719437	0	69999	36000	-12218	329335	50044	-1054049	-68016	-1106553	-86044	-1192597
ZONE TOTAL	4829376	9	615998	359999	-80091	723236	1541343	-6027699	-1763217	-6088519	-1901351	-7989870

CONVECTIVE LOAD BREAKDOWN

AVERAGED ZONE CONVECTIVE HEAT GAINS(+) AND LOSSES(-), BTU/HR

SOURCE NO	NODE NO	SECTION NO	SEGMENT NO	SEGMENT NAME	SENSIBLE GAIN	LATENT GAIN	TOTAL
1	5				353981	1123092	1477073
2	7				33629	190461	224089
3	7				33363	186879	220242
4	9				302262	40909	343171

TIME 990.00 SECONDS 2 TRAIN(S) ARE OPERATIONAL

TRAIN NO.	PTF	TYP	LOCATION (FEET)	SPEED (MPH)	ACCELERATION (MPH/SEC)	AIR DRAG (LBS)	COEF. OF AIR DRAG	TRACTIVE EFFORT (LBS/MOTOR)	MOTOR CURRENT (AMPS)	HORSEPOWER TOTAL	HORSEPOWER AIR DRAG	GRID TEMPERATURE ACCEL. (DEG F)	GRID TEMPERATURE DECEL. (DEG F)	POWER LOSS (BTU/SEC-FT)	HEAT REJECTION (BTU/SEC-FT)
21	1	1	2874.41	18.97	2.82	324.	3.74	2395.	307.	3876.	16.	268.4	739.7	2.503	2.263
22	2	1	2743.59	11.13	-2.50	-64.	-2.13	0.	0.	0.	-2.	241.6	750.7	3.435	1.990

LENGTH (FT)	SYSTEM PARTITIONING	SENSIBLE HEAT LOAD (BTU/SEC)	LATENT HEAT LOAD (BTU/SEC)	AIR TEMPERATURE (DEG F)	HUMIDITY RATIO (LB/LB)	AIR FLOW (CFM)	AIR VELOCITY (FPM)	TRAIN POSITION RTE 1	RTE 2	RTE 3	RTE 4	RTE 5	RTE 6
100.0	1 - 1 (TUNNEL)			WEST PORTAL TO 1100 FT - ROUTE 1									
	1 - 1 - 1	0.2	0.0	82.10	0.01648	96749.8	322.5						
100.0	1 - 2 (TUNNEL)			1100 TO 1200 FT - ROUTE 1									
	1 - 2 - 1	0.2	0.0	82.12	0.01648	96749.8	387.0						
400.0	1 - 3 (TUNNEL)			1200 TO 1600 FT - ROUTE 1									
	1 - 3 - 1	0.4	0.0	82.28	0.01648	96749.8	430.0						
	1 - 3 - 2	0.4	0.0	82.64	0.01648								
600.0	2 - 4 (TUNNEL)			PORTAL TO 1600 FT - ROUTE 2									
	2 - 4 - 1	6.2	0.0	83.95	0.01582	-232932.6	-1035.3						
	2 - 4 - 2	6.2	0.0	83.74	0.01582								
	2 - 4 - 3	6.2	0.0	83.44	0.01581								
110.0	3 -103 (VENTILATION SHAFT)			VENT SHAFT AT 1600 FT - ROUTE 1									
	3 -103 - 1			81.65	0.01648	20712.4	103.6						
95.1	4 -104 (VENTILATION SHAFT)			VENT SHAFT AT 1600 FT - ROUTE 2									
	4 -104 - 1			81.78	0.01631	-48742.9	-367.2						
600.0	5 - 5 (TUNNEL)			1600 TO 2200 FT(START OF STA) -RTE 1									
	5 - 5 - 1	0.4	0.0	82.67	0.01648	76037.4	337.9						
	5 - 5 - 2	0.4	0.0	83.11	0.01648								
	5 - 5 - 3	0.4	0.0	83.65	0.01648								
600.0	6 - 6 (TUNNEL)			1600 TO 2200 FT(START OF STA)- RTE 2									
	6 - 4 - 1	5.9	0.0	83.69	0.01544	-184189.8	-818.6						
	6 - 6 - 2	5.9	0.0	83.22	0.01532								
	6 - 6 - 3	5.9	0.0	82.94	0.01538								

100.0	7 - 7	(STATION)			START OF STATION TO WEST STAIRWAY						
	7 - 7 - 1		-122.3	-297.8	80.00	0.01364	-108152.4	-154.5			22
200.0	8 - 8	(STATION)			WEST END OF MEZZANINE TO STREET EXIT						
	8 - 8 - 1		2.5	-6.6	80.00	0.01364	-34191.3	-76.0			
	8 - 8 - 2		-7.2	-54.4	80.00	0.01364					
400.0	9 - 9	(STATION)			PLATFORM AREA BETWEEN STAIRWAYS						
	9 - 9 - 1		-0.7	-19.6	80.00	0.01364	-73961.1	-105.7		21	22
	9 - 9 - 2		17.5	6.3	80.00	0.01364				21	22
	9 - 9 - 3		19.0	8.6	80.00	0.01364				21	22
	9 - 9 - 4		-0.3	3.7	80.00	0.01364				21	22
20.0	10 -110	(STAIRWAY)			STREET LEVEL STAIRWAY TO MEZZANINE						
	10 -110 - 1				81.04	0.01529	-30248.1	-313.5			
200.0	11 - 10	(STATION)			STREET EXIT TO EAST END OF MEZZANINE						
	11 - 10 - 1		-6.9	-54.7	80.00	0.01364	-3943.3	-8.8			
	11 - 10 - 2		7.9	0.3	80.00	0.01364					
100.0	12 - 11	(STATION)			EAST STAIRWAY TO END OF STATION						
	12 - 11 - 1		-88.1	-13.9	80.00	0.01364	-77904.4	-111.3		21	22
500.0	13 - 12	(TUNNEL)			STATION END TO EXHAUST FAN AT 3300FT						
	13 - 12 - 1		205.7	0.0	84.50	0.01387	-77904.4	-194.8		21	22
	13 - 12 - 2		4.7	0.0	87.24	0.01420					
	13 - 12 - 3		4.7	0.0	89.05	0.01479					
78.7	14 -114	(VENTILATION SHAFT)			FAN SHAFT AT 3300 FT - EXHAUST MODE						
	14 -114 - 1				88.83	0.01537	140712.3	937.9			
400.0	15 - 13	(TUNNEL)			EXHAUST FAN TO 3700 FT						
	15 - 13 - 1		5.8	0.0	89.38	0.01599	-218616.7	-546.5			
	15 - 13 - 2		5.8	0.0	87.82	0.01634					
300.0	15 - 14	(TUNNEL)			3700 FT TO EAST PORTAL AT 4000 FT						
	15 - 14 - 1		4.3	0.0	85.76	0.01644	-218616.7	-312.3			
	15 - 14 - 2		4.3	0.0	83.98	0.01647					

April 14, 1977

SUBWAY ENVIRONMENT SIMULATION (SES) COMPUTER PROGRAM

REVISION NO. 9 TO VERSION 2

Problem

A precision problem occurred in Subroutine TRAIN.

Symptoms

The train performance subprogram subroutines TRAIN and LOCATE monitor and control the passage of a subway train through the system. For the rare circumstance described herein, the train performance subroutines could not properly monitor the location of a train and therefore could not control it. The data set that uncovered the problem had a train initialized at a system location where trains stopped. This initialization data was input in accordance with Input Form 10. After the remaining dwell time was exhausted, the train was dispatched. The train should have had an initial acceleration of 3 mph/sec, reached a constant speed of 55 mph and braked for the next stop along the route. Instead, the train accelerated at 2 mph/sec until it exited the system at over 100 mph. The direct cause of this was that the distance the train was to move during the first time increment after the train was dispatched was 1/4,000,000th of the location of the train along the route. It is beyond the single precision capability of IBM 370 computers to properly add or subtract numbers of this range in magnitude, the result being that the number of larger magnitude is taken as the answer. Therefore, the train performance subprogram could not determine that the train had moved beyond the stopping location and attempted to make the train brake for it. It was then in the computational sequence that the second problem occurred. The train was assigned an acceleration of 2 mph/sec instead of a deceleration of 2 mph/sec with the indicators set by Subroutine TRAIN stating the train was braking.

Correction

See attached partial listings of Subroutines INPUT, LOCATE, and TRAIN. The four lines to be corrected are indicated by a "C." The change in Subroutine INPUT updated the program output to state "Version 2.09." The change in Subroutine LOCATE eliminated the precision problem. The changes in Subroutine TRAIN eliminated the possibility of the train deceleration being given the wrong sign.

Effect on Previous Results

The nature of this problem was such that the train performance subprogram either monitored an initialized train properly or permitted a train to constantly accelerate until it exited the system. The occurrence of this problem may be readily noted by observing the train operations. This problem required a very rare combination of circumstances.

It could only occur if the time at which the train was dispatched was an integer multiple of the complete train evaluation time. Furthermore, it required that the distance the train was to move during the first time increment after the train was dispatched was 1/4,000,000th of the location of the train along the route. This problem could not occur on UNIVAC or CDC computers unless this distance ratio was much smaller, perhaps 1/25,000,000th, because of the greater precision at which they operate.

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                 2 4HAUGU,4HST  ,4HSEPT,4H.   ,4HOCTO,4HBER ,4HNOVE,4HMBER,          01055400
                 3 4HDECE,4HMBER /                                                   01055500
ISN 0150     10   FORMAT (1H1,8A1,8X,'SES',10X,17A4,A2,9X,'PAGE',/,115X,'------')   01055600
ISN 0151     20   FORMAT (17A4,A2)                                                   01055700
ISN 0152     30   FORMAT (8F10.2)                                                    01055800
ISN 0153     40   FORMAT (9A4,4X,4F10.2)                                             01055900
ISN 0154     50   FORMAT (1H1,4(/),T30,'DEPARTMENT OF TRANSPORTATION / TRANSPORTATI001056000
                 1N SYSTEMS CENTER',5(/),T49,5('X'),3X,7('X'),3X,5('X'),/,T48,'X',T501056100
                 27,'X',T66,'X',/,T49,5('X'),T57,5('X'),T67,5('X'),/,T54,'X',T57,'X'01056200
                 3,T72,'X',/,T54,'X',T57,'X',T72,'X',/,T48,6('X'),T57,7('X'),T66,6('01056300
                 4X'),///,T46,'SUBWAY ENVIRONMENT SIMULATION',6(/))                  01056400
ISN 0155     60   FORMAT (1H ,T52,'SIMULATION OF',////,25X,17A4,A2////25X,17A4,A2///01056500
                 1/)                                                                01056600
ISN 0156     70   FORMAT (25X,17A4,A2,////)                                          01056700
ISN 0157     80   FORMAT (1H ,36X,'DESIGN TIME',I5,' HRS',3X,2A4,I6,///)            01056800
ISN 0158     90   FORMAT (1H ,38X,'DESIGN TIME 0',I3,' HRS',3X,2A4,I6,/)             01056900
ISN 0159    100   FORMAT (1H ,56X,8A1,//T95,'PREPARED BY -'//,T97,'PARSONS, BRINCKER01057000
                 1HOFF,',/,T97,'QUADE AND DOUGLAS, INC.',/,T97,'NEW YORK, NEW YORK',01057100
                 2/,T97,'VERSION 2.09')                                             01057200 ← C
ISN 0160    110   FORMAT (1H0,T45,'INPUT VERIFICATION OF GENERAL DATA')             01057300
ISN 0161    120   FORMAT (1H0,T113,'FORM 1C'/T30,'TRAIN PERFORMANCE OPTION',T80,I5,T01057400
                 190,'BYPASS')                                                      01057500
ISN 0162    130   FORMAT (1H0,T113,'FORM 1C'/T30,'TRAIN PERFORMANCE OPTION',T80,I5,T01057600
                 190,'IMPLICIT')                                                    01057700
ISN 0163    140   FORMAT (1H0,T113,'FORM 1C'/T30,'TRAIN PERFORMANCE OPTION',T80,I5,T01057800
                 190,'EXPLICIT (HEAT REJ. COMPUTED)')                               01057900
ISN 0164    150   FORMAT (1H0,T113,'FORM 1C'/T30,'TRAIN PERFORMANCE OPTION',T80,I5,T01058000
                 190,'EXPLICIT (HEAT REJ. INPUT)')                                  01058100
ISN 0165    160   FORMAT (1H0,T30,'TEMPERATURE / HUMIDITY SIMULATION OPTION',T80,I5,01058200
                 1T90,'BYPASS')                                                     01058300
ISN 0166    170   FORMAT (1H0,T30,'TEMPERATURE / HUMIDITY SIMULATION OPTION',T80,I5,01058400
                 1T90,'YES')                                                        01058500
ISN 0167    180   FORMAT (1H0,T30,'TEMPERATURE / HUMIDITY SIMULATION OPTION',T80,I5,01058600
                 1T90,'YES - EVAPORATION')                                          01058700
ISN 0168    190   FORMAT (1H0,T30,'HUMIDITY DISPLAY OPTION',T80,I5,T90,'HUMIDITY RAT01058800
                 1IO')                                                              01058900
ISN 0169    200   FORMAT (1H0,T30,'HUMIDITY DISPLAY OPTION',T80,I5,T90,'WET-BULB TEM01059000
                 1PERATURE')                                                        01059100
ISN 0170    210   FORMAT (1H0,T30,'HUMIDITY DISPLAY OPTION',T80,I5,T90,'RELATIVE HUM01059200
                 1IDITY')                                                           01059300
ISN 0171    220   FORMAT (1H0,T30,'ENVIRONMENTAL CONTROL LOAD EVALUATION OPTION',T8001059400
                 1,I5,T90,'BYPASS')                                                 01059500
ISN 0172    230   FORMAT (1H0,T30,'ENVIRONMENTAL CONTROL LOAD EVALUATION OPTION',T8001059600
                 1,I5,T90,'YES')                                                    01059700
ISN 0173    240   FORMAT (1H0,T30,'ENVIRONMENTAL CONTROL LOAD EVALUATION OPTION',T8001059800
                 1,I5,T90,'OFF-HOUR')                                               01059900
ISN 0174    250   FORMAT (1H0,T30,'HEAT SINK SUMMARY PRINT OPTION',T80,I5,T90,'BYPAS01060000
                 1S')                                                               01060100
ISN 0175    260   FORMAT (1H0,T30,'HEAT SINK SUMMARY PRINT OPTION',T80,I5,T90,'YES'101060200
ISN 0176    270   FORMAT (1H0,T30,'SUPPLEMENTARY OUTPUT OPTION',T80,I5)             01060300
ISN 0177    280   FORMAT (1H0,T30,'ALLOWABLE SIMULATION ERRORS',T80,I5)             01060400
ISN 0178    290   FORMAT (1H0,T30,'ALLOWABLE INPUT ERRORS',T80,I5)                  01060500
ISN 0179    300   FORMAT (1H0,T30,'ALLOWABLE INPUT ERRORS',T80,I5,T90,'NO SIMULATION01060600
                 1')                                                                01060700
ISN 0180    310   FORMAT (/1H0,T30,'NUMBER OF LINE SEGMENTS',T80,I5,T113,'FORM 1D') 01060800
```

```
ISN 0152      100 IF (XV(NUMV)-FSTS(JTS,IROUTE)) 130,110,110--                  01393800
            C---- TRAIN HAS MOVED PAST T.S. BOUNDARY -ADVANCE 'JTS' PAST TRAIN FRONT01393900
ISN 0153      110 JTS = JTS + 1                                                 01394000
            C---- CHECK FOR END OF TRACK SECTIONS                               01394100
ISN 0154          IF( JTS - NTS ) 100,100,120                                   01394200
            C---- FRONT OF TRAIN IS PAST LAST T.S.  -  OUTSIDE OF TUNNEL SYSTEM 01394300
ISN 0155      120 JTS = NTS                                                     01394400
ISN 0156          SUM = XV(NUMV) - FSTS(NTS,IROUTE)                             01394500
ISN 0157          IDIR = 0                                                      01394600
ISN 0158          ISEGF = 0                                                     01394700
            C---- DRAG ON FRONT OF TRAIN AND SIDES OF LENGTH 'SUM'              01394800
ISN 0159          DRAGV(NUMV)=(CDFVOV(ITYP)/2.0+LAMDAV(ITYP)*SUM/               01394900
                 1(8.0*AV(ITYP)))*UV(NUMV)*UV(NUMV)                             01395000
ISN 0160          ISEG=NSEGTS(JTS,IROUTE)                                       01395100
ISN 0161          ISEG=IABS(ISEG)                                               01395200
ISN 0162          NTSV(NUMV)=JTS                                                01395300
ISN 0163          IF( ISEG ) 175,175,160                                        01395400
            C---- FRONT OF TRAIN IS LOCATED WITHIN TRACK SECTIONS               01395500
ISN 0164      130 SUM = 0.0                                                     01395600
            C---- GET SEGMENT NUMBER AND DIRECTION OF TRAIN MOVEMENT IN SEGMENT 01395700
ISN 0165      140 ISEG=NSEGTS(JTS,IROUTE)                                       01395800
ISN 0166          ISEG=IABS(ISEG)                                               01395900
ISN 0167          NTSV(NUMV)=JTS                                                01396000
ISN 0168          ISEGF = ISEG                                                  01396100
            C---- CHECK IF OUTSIDE OF TUNNEL SYSTEM                             01396200
ISN 0169          IF( ISEG ) 150,150,160                                        01396300
            C---- OUTSIDE OF TUNNEL SYSTEM                                      01396400
ISN 0170      150 IDIR = 0                                                      01396500
            C---- DRAG ON FRONT OF TRAIN                                        01396600
ISN 0171          DRAGV(NUMV) = CDFVOV(ITYP)*UV(NUMV)*UV(NUMV)/2.0              01396700
ISN 0172          GO TO 175                                                     01396800
            C---- TRAIN IS INSIDE TUNNEL SYSTEM - STORE SEGMENT OF TRAIN FRONT  01396900
ISN 0173      160 IDIR = NSEGTS(JTS,IROUTE) / ISEG                              01397000
            C---- INCREMENT NUMBER OF TRAINS IN THIS SEGMENT                    01397100
ISN 0174          NTRNLS(ISEG) = NTRNLS(ISEG) + 1                               01397200
ISN 0175          NTRN = NTRNLS(ISEG)                                           01397300
ISN 0176          NF = 2 * NTRN                                                 01397400
ISN 0177          NB = NF - 1                                                   01397500
            C---- CHECK IF GREATER THAN MAXIMUM NUMBER OF TRAINS ALLOWED IN SEGMENT 01397600
            C----     LIMITED BY ARRAY SIZE ('TRNNLS','TRNDLS') TO 'LMTRSG' TRAINS 01397700
ISN 0178          IF( NTRN - LMTRSG ) 170,170,800                               01397800
ISN 0179      170 TRNNLS(ISEG,NTRN) = IDIR * NUMV                               01397900
ISN 0180      175 TNL1 = XV(NUMV) - FSTS(JTS-1, IROUTE)                         01398000
            C                                                                   01398100
            C---- CHECK IF ENTIRE TRAIN HAS BEEN PROPORTIONED                   01398200
            C                                                                   01398300
ISN 0181      200 IF( SUM + TNL1 - LV(ITYP) ) 210,400,400                       01398400
            C---- CONTINUE PROPORTIONING TRAIN OVER TRACK SECTIONS              01398500
ISN 0182      210 SUM = SUM + TNL1                                              01398600
ISN 0183          RG = RG + TNL1 * GRDTS(JTS,IROUTE)                            01398700
ISN 0184          IF( RADTS(JTS,IROUTE) ) 225,225,220                           01398800
ISN 0185      220 RC = RC + TNL1 / RADTS(JTS,IROUTE)                            01398900
ISN 0186      225 IF( ISEG ) 227,227,230                                        01399000
            C---- COMPUTE DRAG ON TRAIN SIDE OF LENGTH 'TNL1'                   01399100
ISN 0187      227 DRAGV(NUMV)=DRAGV(NUMV)+LAMDAV(ITYP)*TNL1/                    01399200
```

C

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                C*****BELOW SPEED V1 - CONSTANT DECELERATION RATE                    02633400
ISN 0303          510 JTS2=NTSV2(NUMV)                                               02633500
ISN 0304              IF (ABS(UMXTS(JTS2,IROUTE))-0.1) 520,530,530                   02633600
                C*****TRAIN IS STOPPING FOR A STATION                                02633700
                C*****COMPUTE STOPPING TIME AND DECELERATION RATE                    02633800
ISN 0305          520 STTIM=(FSTS(JTS2-1,IROUTE)-XV(NUMV))*2.0/UV(NUMV)              02633900
ISN 0306              IF( STTIM ) 537,537,525                                        02633910
ISN 0307          525 DUDTV(NUMV)=-UV(NUMV)/STTIM                                    02634000
ISN 0308              GO TO 540                                                      02634100
                C*****TRAIN IS SLOWING FOR A SPEED RESTRICTION                       02634200
                C*****ADJUST STOPPING TIME TO AN INTEGER DELTA T                     02634300
ISN 0309          530 STTIM=(UV(NUMV)-ABS(UMXTS(JTS2,IROUTE)))/DECV(ITYP)            02634400
ISN 0310              INT=IFIX(STTIM/DELT+0.9999)                                    02634500
ISN 0311              STTIM=FLOAT(INT)*DELT                                          02634600
ISN 0312              IF( STTIM ) 537,537,535                                        02634610
ISN 0313          535 DUDTV(NUMV)=(ABS(UMXTS(JTS2,IROUTE))-UV(NUMV))/STTIM           02634700
ISN 0314              GO TO 540                                                      02634710
                C**** USE MAXIMUM DECELERATION RATE                                  02634720
ISN 0315          537 DUDTV(NUMV)=-DECV(ITYP)                                        02634730 ◄———— C
                C*****SWITCH TO MODE 4                                               02634800
                C*****USE THIS DECELERATION RATE FOR REMAINDER OF BRAKING CYCLE      02634900
ISN 0316          540 MODEV(NUMV)=4                                                  02635000
ISN 0317              GO TO 820                                                      02635100
                C*****TRAIN HAS STOPPED                                              02635200
ISN 0318          550 MODEV(NUMV)=0                                                  02635300
ISN 0319              DUDTV(NUMV)=0.0                                                02635400
ISN 0320              UV(NUMV)=0.0                                                   02635500
ISN 0321              JTS=NTSV2(NUMV)                                                02635600
ISN 0322              XV(NUMV)=FSTS(JTS,IROUTE)                                      02635700
                C*****COMPUTE TIME OF RESTART                                        02635800
ISN 0323              TSTRTV(NUMV)=NTIME+DWLTS(JTS,IROUTE)                           02635900
ISN 0324              NTSV(NUMV)=NTSV2(NUMV)+1                                       02636000
ISN 0325              TEV(NUMV)=0.0                                                  02636100
ISN 0326              AMPV(NUMV)=0.0                                                 02636200
ISN 0327              AMPLV(NUMV)=0.0                                                02636300
ISN 0328              QACCV(NUMV)=0.0                                                02636400
ISN 0329              QDECV(NUMV)=0.0                                                02636500
ISN 0330              RMHTV(NUMV)=0.0                                                02636600
                C*****COMPUTE NEW WEIGHT OF PATRONS ON TRAIN                         02636700
ISN 0331              WPATV(NUMV)=WPATV(NUMV)+NPETTS(JTS,IROUTE)*PATWHT              02636800
ISN 0332              GO TO 820                                                      02636900
                C                                                                    02637000
                C*****COASTING MODE - MODE=5                                         02637100
                C                                                                    02637200
                C*****COMPUTE NEW ACCELERATION                                       02637300
ISN 0333          560 DUDTV(NUMV)=-RSISTV(NUMV)/(WV(ITYP)*RRACC(ITYP)+WPATV(NUMV)/GRACC)02637400
                C*****COMPUTE ANTICIPATED SPEED                                      02637500
ISN 0334              UNEW=UV(NUMV)+DUDTV(NUMV)*DELT                                 02637600
                C*****IF ANTICIPATED SPEED IS LESS THAN UMIN THEN SWITCH TO ANOTHER MODE02637700
ISN 0335              IF (UNEW-UMINRT(IROUTE)) 570,570,600                           02637800
ISN 0336          570 UNEW=UMINRT(IROUTE)                                            02637900
                C*****COMPUTE NEW TRAIN LOCATION AND STORE NEW TRAIN SPEED            02638000
ISN 0337              XV(NUMV)=XV(NUMV)+0.5*DELT*(UV(NUMV)+UNEW)                     02638100
ISN 0338              UV(NUMV)=UNEW                                                  02638200
ISN 0339              DUDTV(NUMV)=0.0                                                02638300
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                 IV(ITYP)**2-DECBV(ITYP)*T1/DECAV(ITYP)                  02654900
ISN 0431         IF (ABS(UMXTS(JTS,IROUTE))-DECVIV(ITYP)) 980,980,970    02655000
           C*****CONSTANT DECELERATION PORTION OF CURVE IS NOT BEING USED 02655100
           C*****BECAUSE SPEED RESTRICTION 'UMXTS' IS ABOVE 'DECVIV'      02655200
ISN 0432       970 STDIS=S1                                              02655300
ISN 0433         GO TO 990                                               02655400
           C*****COMPUTE BRAKING TIME AND DISTANCE ON CONSTANT DECELERATION 02655500
           C*****PORTION OF CURVE                                        02655600
ISN 0434       980 T2=(DECVIV(ITYP)-ABS(UMXTS(JTS,IROUTE)))/DECV(ITYP)   02655700
ISN 0435         S2=DECVIV(ITYP)*T2-0.5*DECV(ITYP)*T2**2                 02655800
ISN 0436         STDIS=S1+S2                                             02655900
           C*****CHECK IF NECESSARY TO BRAKE FOR THIS SPEED RESTRICTION BEFORE 02656000
           C*****NEXT COMPLETE TRAIN EVALUATION                          02656100
ISN 0437       990 IF (STDIS+UV(NUMV)*DELTR+0.5*DUDTV(NUMV)*DELTR**2-(FSTS(JTS-1,IROU02656200
                 TE)-XV(NUMV))) 1050,1050,1000                           02656300
           C*****IT IS NECESSARY TO BRAKE NOW - SWITCH TO MODE 3 OR 4    02656400
           C*****SET TRACK SECTION TRAIN IS BRAKING FOR                  02656500
ISN 0438      1000 NTSV2(NUMV)=JTS                                       02656600
           C*****TURN TRAIN POWER OFF                                    02656700
ISN 0439         TEV(NUMV)=0.0                                           02656800
ISN 0440         AMPV(NUMV)=0.0                                          02656900
ISN 0441         AMPLV(NUMV)=0.0                                         02657000
           C*****COMPUTE DECELERATION RATE                               02657100
ISN 0442         IF (UV(NUMV)-DECVIV(ITYP)) 1020,1020,1010               02657200
           C*****ABOVE SPEED V1 - VARYING DECELERATION RATE              02657300
ISN 0443      1010 MODEV(NUMV)=3                                         02657400
ISN 0444         DUDTV(NUMV)=-DECBV(ITYP)-DECAV(ITYP)*UV(NUMV)           02657500
ISN 0445         GO TO 1070                                              02657600
           C*****BELOW SPEED V1 - CONSTANT DECELERATION RATE             02657700
ISN 0446      1020 MODEV(NUMV)=4                                         02657800
ISN 0447         IF (ABS(UMXTS(JTS,IROUTE))-0.1) 1030,1040,1040          02657900
           C*****TRAIN IS STOPPING FOR A STATION                         02658000
           C*****COMPUTE STOPPING TIME AND DECELERATION RATE             02658100
ISN 0448      1030 STTIM=(FSTS(JTS-1,IROUTE)-XV(NUMV))*2.0/UV(NUMV)      02658200
ISN 0449         IF( STTIM ) 1047,1047,1035                              02658210
ISN 0450      1035 DUDTV(NUMV)=-UV(NUMV)/STTIM                           02658300
ISN 0451         GO TO 1070                                              02658400
           C*****TRAIN IS SLOWING FOR A SPEED RESTRICTION                02658500
           C*****ADJUST STOPPING TIME TO AN INTEGER DELTA T              02658600
ISN 0452      1040 STTIM=(UV(NUMV)-ABS(UMXTS(JTS,IROUTE)))/DECV(ITYP)    02658700
ISN 0453         INT=IFIX(STTIM/DELT+0.9999)                             02658800
ISN 0454         STTIM=FLOAT(INT)*DELT                                   02658900
ISN 0455         IF( STTIM ) 1047,1047,1045                              02658910
ISN 0456      1045 DUDTV(NUMV)=(ABS(UMXTS(JTS,IROUTE))-UV(NUMV))/STTIM   02659000
ISN 0457         GO TO 1070                                              02659100
           C*****USE MAXIMUM DECELERATION RATE                           02659110
ISN 0458      1047 DUDTV(NUMV)=-DECV(ITYP)                               02659120 ◄———— C
ISN 0459         GO TO 1070                                              02659130
           C*****SPEED RESTRICTION IS HIGHER THAN CURRENT SPEED OR THERE IS 02659200
           C*****SUFFICIENT BRAKING DISTANCE                             02659300
           C*****CHECK FOR A STATION (MAXIMUM SPEED OF ZERO)             02659400
ISN 0460      1050 IF (ABS(UMXTS(JTS,IROUTE))-0.1) 1070,1070,1060        02659500
ISN 0461      1060 JTS=JTS+1                                             02659600
ISN 0462         GO TO 990                                               02659700
ISN 0463      1070 CONTINUE                                              02659800
```

August 12, 1977

SUBWAY ENVIRONMENT SIMULATION (SES) COMPUTER PROGRAM

REVISION NO. 10 TO VERSION 2

Problem

An incorrect upper limit was used for checking the Front of Train Drag Coefficient on Input Form 9B.

Symptoms

The allowable range of the Front of Train Drag Coefficient on Input Form 9B should be from 0.0 to 1.5. An upper limit of 1.0 was being incorrectly used. This caused an Error Type 115 message to be incorrectly printed for values ranging from 1.0 to 1.5.

Correction

See the attached partial listing of subroutine GARAGE. The line to be corrected is indicated by a "C."

Effect on Previous Results

None.

```
                 INT REQUIRED BASED ON THE VEHICLE DATA',                          00777300
                 2 / 1H0,2(4X,'SPEED',6X,'TRACTIVE EFFORT',4X,'MOTOR CURRENT',3X,  00777400
                 3 'LINE CURRENT',2X) ,T67,'.',/1H ,                               00777500
                 4 2(4X,'(MPH)',8X,'(LBS/MOTOR)',6X,'(AMPS/MOTOR)',3X,'(AMPS/PWR CAR00777600
                 5)',1X),T67,'.',/,T67,'.')                                        00777700
ISN 0197     452  FORMAT (1H ,2(3X,F6.1,F16.0,2F17.0,5X),T67,'.')                  00777800
ISN 0198     460  FORMAT (1H ,6X,2(F10.1,F18.0,F17.0,8X) , T61,'.' )               00777900
ISN 0199     461  FORMAT (/1H0,' INTERNAL MOTOR RESISTANCE',T80,F14.3,T97,'OHMS/MOT00778000
                 1R',T113,'FORM 9H')                                               00778100
ISN 0200     470  FORMAT (/1H0,' MOTOR CIRCUIT RESISTANCE PER MOTOR  (SUM OF MOTOR A)00778200
                 IND EXTERNAL RESISTANCES)',T113,'FORM 9H' )                       00778300
ISN 0201     475  FORMAT(1H0,T10,'RESISTANCE',T29,3F12.3,T97,'OHMS')               00778400
ISN 0202     480  FORMAT (1H0,T10,'SPEED',T38,'0.0',2F12.1,T97,'MPH')              00778500
ISN 0203     490  FORMAT (1H0,' MAXIMUM ALLOWABLE ACCELERATION RATE',              00778600
                 1  T80,F14.1,T97,'MPH/SEC' ,T113,'FORM 9I' )                     00778700
ISN 0204     500  FORMAT (1H0,' NORMAL DECELERATION RATE FROM SPEED V1 TO ZERO',T80,00778800
                 1 F14.1,T97,'MPH/SEC')                                            00778900
ISN 0205     510  FORMAT (1H0,' SPEED V1',T80,F14.1,T97,'MPH')                    00779000
ISN 0206     520  FORMAT (1H0,' NORMAL DECELERATION RATE AT SPEED V2',T80,F14.1,T97,00779100
                 1  'MPH/SEC')                                                    00779200
ISN 0207     530  FORMAT (1H0,' SPEED V2',T80,F14.1,T97,'MPH')                    00779300
             C                                                                    00779400
             C                                                                    00779500
             C-----    INPUT FORM 9A                                              00779600
ISN 0208          READ (IN,110) NUMMY1,DUMY1,DUMY2,LV(I),AV(I)                    00779700
ISN 0209          WRITE (OUT,130) I,NUMMY1                                        00779800
ISN 0210          NCARV(I)=DUMY1                                                  00779900
ISN 0211          NUMY1=DUMY1                                                     00780000
ISN 0212          WRITE (OUT,150) NUMY1                                           00780100
ISN 0213          CALL CHECKI (NUMY1,1,20,51)                                     00780200
ISN 0214          NPCARV(I)=DUMY2                                                 00780300
ISN 0215          NUMY2=DUMY2                                                     00780400
ISN 0216          WRITE(OUT,155) NUMY2                                            00780500
ISN 0217          CALL CHECKI( NUMY2, 1, NUMY1, 116 )                             00780600
ISN 0218          WRITE (OUT,160) LV(I)                                           00780700
ISN 0219          CALL CHECKR (LV(I),25.0,1500.0,52)                              00780800
ISN 0220          WRITE (OUT,170) AV(I)                                           00780900
ISN 0221          CALL CHECKR (AV(I),25.0,300.0,53)                               00781000
             C                                                                    00781100
             C-----    INPUT FORM 9B                                              00781200
ISN 0222          READ(IN,120) PERMV(I),LAMDAV(I),DUMY2,CDEVOV(I),SHREV(I),THREV(I) 00781300
ISN 0223          WRITE (OUT,180) PERMV(I)                                        00781400
ISN 0224          CALL CHECKR (PERMV(I),20.0,200.0,78)                            00781500
ISN 0225          DUMY1=PERMV(I)-(4.0*PI*AV(I))**0.5                              00781600
ISN 0226          IF (DUMY1) 540,550,550                                          00781700
ISN 0227     540  CALL ERROR (70)                                                 00781800
ISN 0228       550 WRITE (OUT,190) LAMDAV(I)                                      00781900
ISN 0229          CALL CHECKR (LAMDAV(I),0.0,0.10,55)                             00782000
ISN 0230          CDBVOV(I)=0.029/SQRT(0.5*LV(I)*LAMDAV(I)*PERMV(I)/(4.0*AV(I)))  00782100
ISN 0231          WRITE(OUT,195) DUMY2                                            00782200
ISN 0232          CALL CHECKR(DUMY2,0.0,500.0,201)                                00782300
ISN 0233          DUMY2=DUMY2/(4.0*LV(I)*PERMV(I))                                00782400
ISN 0234          LAMDAV(I)=LAMDAV(I)+DUMY2                                       00782500
ISN 0235          LAMDAV(I)=LAMDAV(I)*PERMV(I)                                    00782600
ISN 0236          WRITE (OUT,210) CDEVOV(I)                                       00782700
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ISN 0237          CALL CHECKR ( CDFVOV(I), 0.0, 1.5, 115 )                  00782800 <---- C
ISN 0238          WRITE (OUT,230) SHREV(I)                                  00782900
ISN 0239          CALL CHECKR (SHREV(I),0.0,0.1E7,57)                       00783000
ISN 0240          WRITE(OUT,235)  LHREV(I)                                  00783100
ISN 0241          CALL CHECKR (LHREV(I),0.0,0.2E6,58)                       00783200
            C                                                               00783300
            C**** RESISTOR GRID DATA                                        00783400
            C-----    INPUT FORM 9C                                         00783500
ISN 0242          WRITE (OUT,240)                                           00783600
ISN 0243          READ (IN,120) DUMY1,DUMY2,DIACGV(I),DIDCGV(I),ACACCV(I),ACDECV(I),00783700
                 1  ARACCV(I), ARDECV(I)                                    00783800
ISN 0244          WRITE (OUT,250) DUMY1,DUMY2                               00783900
ISN 0245          CALL CHECKR (DUMY1,0.0,2000.,101)                         00784000
ISN 0246          CALL CHECKR (DUMY2,0.0,2000.,102)                         00784100
ISN 0247          WRITE (OUT,260) DIACGV(I),DIDCGV(I)                       00784200
ISN 0248          CALL CHECKR (DIACGV(I),0.0,24.,103)                       00784300
ISN 0249          CALL CHECKR (DIDCGV(I),0.0,24.,104)                       00784400
ISN 0250          DIACGV(I)=DIACGV(I)/FTIN                                  00784500
ISN 0251          DIDCGV(I)=DIDCGV(I)/FTIN                                  00784600
ISN 0252          WRITE (OUT,270) ACACCV(I),ACDECV(I)                       00784700
ISN 0253          CALL CHECKR (ACACCV(I),0.0,500.,105)                      00784800
ISN 0254          CALL CHECKR (ACDECV(I),0.0,500.,106)                      00784900
ISN 0255          WRITE (OUT,280) ARACCV(I),ARDECV(I)                       00785000
ISN 0256          CALL CHECKR (ARACCV(I),0.0,500.,107)                      00785100
ISN 0257          CALL CHECKR (ARDECV(I),0.0,500.,108)                      00785200
ISN 0258          READ (IN,120) EMISAG(I),EMISDG(I),DUMY3,DUMY4, TIACCV(I),TIDECV(I)00785300
ISN 0259          WRITE (OUT,290) EMISAG(I),EMISDG(I)                       00785400
ISN 0260          CALL CHECKR (EMISAG(I),0.0,1.0,109)                       00785500
ISN 0261          CALL CHECKR (EMISDG(I),0.0,1.0,110)                       00785600
ISN 0262          WRITE (OUT,300) DUMY3,DUMY4                               00785700
ISN 0263          CALL CHECKR (DUMY3,0.0,1.0,111)                           00785800
ISN 0264          CALL CHECKR (DUMY4,0.0,1.0,112)                           00785900
ISN 0265          IF( ABS(TIACCV(I)) - 0.1 ) 553,554,554                    00786000
ISN 0266      553 TIACCV(I) = TDBAMB                                        00786100
ISN 0267      554 IF( ABS(TIDECV(I)) - 0.1 ) 555,556,556                    00786200
ISN 0268      555 TIDECV(I) = TDBAMB                                        00786300
ISN 0269      556 WRITE(OUT,302)  TIACCV(I),TIDECV(I)                       00786400
ISN 0270          MCPGAV(I)=DUMY1*DUMY3                                     00786500
ISN 0271          MCPGDV(I)=DUMY2*DUMY4                                     00786600
ISN 0272          IF (DUMY1-0.01) 560,560,570                               00786700
ISN 0273      560 MCPGAV(I)=0.0                                             00786800
ISN 0274          WRITE (OUT,310)                                           00786900
ISN 0275      570 IF (DUMY2-0.01) 580,580,590                               00787000
ISN 0276      580 MCPGDV(I)=0.0                                             00787100
ISN 0277          WRITE (OUT,320)                                           00787200
ISN 0278      590 CONTINUE                                                  00787300
            C                                                               00787400
ISN 0279          WRITE (OUT,9) DATE,SYSTEM                                 00787500
ISN 0280          WRITE (OUT,140) I,NUMMY1                                  00787600
            C                                                               00787700
            C-----    INPUT FORM 9D                                         00787800
ISN 0281          READ (IN,120) WV(I),MOTORV(I),CORMV(I,1),CORMV(I,2),      00787900
                 1  CORMV(I,3),DUMY4                                        00788000
ISN 0282          WRITE (OUT,325) WV(I)                                     00788100
ISN 0283          CALL CHECKR (WV(I),5.0,150.0,56)                          00788200
```

August 12, 1977

SUBWAY ENVIRONMENT SIMULATION (SES) COMPUTER PROGRAM

REVISION NO. 11 TO VERSION 2

Problem

Two problems existed in the routine which processes the Train Route Description input data.

Symptoms

Input data processing was not being terminated immediately after printing Error Type 65 (a fatal error) for the First Train Type on Input Form 8A.

The offending section number was not being printed when Error Type 124, 153 or 180 was detected on Input Form 8F.

Correction

See the attached partial listing of subroutine TRINS. The five lines that are to be inserted are indicated by the letter "I." The six lines that are to be changed are indicated by the letter "C."

Effect on Previous Results

None.

```
ISN 0219          GO TO 389                                                  02717700
ISN 0220        385 CALL ERROR(215)                                          02717800
ISN 0221          COPTRT(IROUTE)=0                                           02717900
                C*****SET NUMBER OF TRAINS IN FIRST TRAIN GROUP TO ONE       02718000
ISN 0222        389 NTRGR(1,IROUTE)=1                                        02718100
                C*****STORE TYPE OF TRAINS IN FIRST TRAIN GROUP              02718200
ISN 0223          GRTYPV(1,IROUTE)=DUMY4                                     02718300
ISN 0224          NUMY3=DUMY4                                                02718400
ISN 0225          NUMY1=1                                                    02718500
ISN 0226          NUMY2=IA                                                   02718600
ISN 0227          WRITE (OUT,90)                                             02718700
                C*****WRITE FIRST TRAIN GROUP INFORMATION                    02718800
ISN 0228          WRITE (OUT,100) NUMY1,NTRGR(1,IROUTE),NUMY3,IA,NUMY2       02718900
                C*****CHECK TRAIN TYPE                                       02719000
ISN 0229          CALL CHECKI (NUMY3,1,NTRTYP,65)                            02719100
ISN 0230          GO TO ( 1370, 387),NFW                                     02719110 <--- I
                C*****INITIALIZE TRAIN DISPATCHER GROUP COUNTER, NUMBER OF TRAINS 02719200
                C*****ALREADY DISPATCHED FOR THIS GROUP, AND TIME OF NEXT (FIRST) TRAIN 02719300
                C*****DISPATCH                                               02719400
ISN 0231        387 JGROUP(IROUTE) = 1                                       02719500 <--- C
ISN 0232          NMTRGR(IROUTE)=0                                           02719600
ISN 0233          NTIMTR(IROUTE)=GRHDWY(1,IROUTE)                            02719700
                C*****CHECK FOR READING OF ADDITIONAL TRAIN GROUP DATA       02719800
ISN 0234          IB=NGRV(IROUTE)                                            02719900
ISN 0235          IF (IB-2) 410,390,390                                      02720000
                C                                                            02720100
                C                                                            02720200
                C***** INPUT FORM 8B - TRAIN GROUP DATA FOR REST OF GROUPS - TPOPT=1,2,3 02720300
                C                                                            02720400
                C                                                            02720500
                C*****LOOP OVER REST OF TRAIN GROUPS                         02720600
ISN 0236        390 DO 400 IC=2,IB                                           02720700
                C*****READ AND STORE NUMBER OF TRAINS IN GROUP, THEIR TYPE, AND HEADWAY 02720800
ISN 0237          READ (IN,340) DUMY1,DUMY2,DUMY3                            02720900
ISN 0238          NTRGR(IC,IROUTE)=DUMY1                                     02721000
ISN 0239          GRTYPV(IC,IROUTE)=DUMY2                                    02721100
ISN 0240          IA=DUMY3                                                   02721200
                C*****HEADWAY IS STORED IN 100TH'S OF SECONDS                02721300
ISN 0241          GRHDWY(IC,IROUTE)=IA*100                                   02721400
                C*****COMPUTE TIME LAST TRAIN IN THIS GROUP IS DISPATCHED    02721500
ISN 0242          NUMY2=NUMY2+NTRGR(IC,IROUTE)*IA                            02721600
ISN 0243          WRITE (OUT,100) IC,NTRGR(IC,IROUTE),GRTYPV(IC,IROUTE),IA,NUMY2 02721700
                C*****CHECK NUMBER OF TRAINS IN GROUP AND THEIR TYPE         02721800
ISN 0244          NUMY1=NTRGR(IC,IROUTE)                                     02721900
ISN 0245          CALL CHECKI (NUMY1,1,1000,66)                              02722000
ISN 0246          NUMY1=GRTYPV(IC,IROUTE)                                    02722100
ISN 0247          CALL CHECKI (NUMY1,1,NTRTYP,65)                            02722200
ISN 0248          GO TO (1370,400), NFW                                      02722300
                C*****CHECK HEADWAY                                          02722400
ISN 0249        400 CALL CHECKI (IA,0,10000,67)                              02722500
ISN 0250        410 GO TO (420,420,670), TPOPT                               02722600
                C                                                            02722700
                C                                                            02722800
                C***** INPUT FORM 8C - TRACK SECTION DATA - TPOPT=1,2        02722900
                C                                                            02723000
```

```
ISN 0458        970 NUMY4=NTS-JTS+1                                          02750600
ISN 0459            DO 980 K=1,NUMY4                                         02750700
ISN 0460            NUMY5=NTS-K+1                                            02750800
ISN 0461            DWLTS(NUMY5+1,IROUTE)=DWLTS(NUMY5,IROUTE)                02750900
ISN 0462            NPETTS(NUMY5+1,IROUTE)=NPETTS(NUMY5,IROUTE)              02751000
ISN 0463            UMXTS(NUMY5+1,IROUTE)=UMXTS(NUMY5,IROUTE)                02751100
ISN 0464            GRDTS(NUMY5+1,IROUTE)=GRDTS(NUMY5,IROUTE)                02751200
ISN 0465            FSTS(NUMY5+1,IROUTE)=FSTS(NUMY5,IROUTE)                  02751300
ISN 0466        980 RADTS(NUMY5+1,IROUTE)=RADTS(NUMY5,IROUTE)                02751400
              C --  INSERT TRACK SECTION BOUNDARY AT 'DIST'                 02751500
ISN 0467            DWLTS(JTS,IROUTE)=0                                      02751600
ISN 0468            NPETTS(JTS,IROUTE)=0                                     02751700
ISN 0469            FSTS(JTS,IROUTE)=DIST                                    02751800
ISN 0470            NTSRT(IROUTE)=NTSRT(IROUTE)+1                            02751900
ISN 0471            NTS=NTSRT(IROUTE)                                        02752000
ISN 0472            NSEGTS(NTS,IROUTE)=0                                     02752100
              C                                                              02752200
              C --  READ SECTIONS AND INSERT SEGMENTS INTO TRACK SECTION ARRAYS 02752300
ISN 0473        990 ISCT=0                                                   02752400
ISN 0474            ISIGN=0                                                  02752500
ISN 0475            DO 1270 ISEC=1,KSECT                                     02752600
ISN 0476            ISCT2=ISCT                                               02752700
ISN 0477            ISIGN2=ISIGN                                             02752800
ISN 0478            READ (IN,340) DUMY1                                      02752900
ISN 0479            ISCTX=ABS(DUMY1)                                         02753000
ISN 0480            ISIGN=DUMY1/(ABS(DUMY1)-.01)                             02753100
ISN 0481            CALL CHECKI (ISCTX,1,LMSCTX,153)                         02753200
ISN 0482            GO TO( 1010, 996 ), NEW                                  02753210 <---I
ISN 0483        996 ISCT = TABL14(ISCTX)                                     02753300 <---C
ISN 0484            IF (ISCT) 1010,1010,1000                                 02753400
ISN 0485       1000 IF( TABL9(ISCT) ) 1020,1010,1020                         02753500 <---C
ISN 0486       1010 WRITE(OUT,1011) ISCTX                                    02753510 <---I
ISN 0487       1011 FORMAT(1H0,10X,'SECTION',I4 )                            02753520 <---I
ISN 0488            CALL ERROR( 124 )                                        02753600 <---C
ISN 0489            GO TO 1370                                               02753700
ISN 0490       1020 IA=ISCTX*ISIGN                                           02753800
ISN 0491            K2=0                                                     02753900
ISN 0492            ISEGL=TABL9(ISCT)                                        02754000
ISN 0493            ISEGH=TABL10(ISCT)                                       02754100
ISN 0494            IF (ISEGL) 1030,1030,1040                                02754200
ISN 0495       1030 WRITE(OUT,1011) ISCTX                                    02754210 <---I
ISN 0496            CALL ERROR ( 180 )                                       02754300 <---C
ISN 0497            GO TO 1370                                               02754400
              C---- LOOP OVER SEGMENTS IN THIS SECTION                       02754500
              C --  THIS 'DO 1260' RUNS FORWARD IF ISIGN IS +, BACKWARD IF ISIGN IS - 02754600 <---C
ISN 0498       1040 IF (ISIGN) 1060,1270,1050                                02754700
ISN 0499       1050 ISEG=ISEGL                                               02754800
ISN 0500            ISEG2=ISEGH                                              02754900
ISN 0501            INC=+1                                                   02755000
ISN 0502            GO TO 1070                                               02755100
ISN 0503       1060 ISEG=ISEGH                                               02755200
ISN 0504            ISEG2=ISEGL                                              02755300
ISN 0505            INC=-1                                                   02755400
              C                                                              02755500
ISN 0506       1070 DIST1=DIST                                               02755600
```

August 12, 1977

SUBWAY ENVIRONMENT SIMULATION (SES) COMPUTER PROGRAM

REVISION NO. 12 TO VERSION 2

Problem

Under certain circumstances the rear-of-train component of the aerodynamic drag on a train was being computed incorrectly.

Symptoms

The rear-of-train component of the train aerodynamic drag was being computed incorrectly when a tunnel system was being simulated and the rear of the train was outside the tunnel system. This component of the train drag was computed correctly when the rear of the train was inside the tunnel system or when a tunnel system was not being simulated.

Correction

See the attached partial listing of subroutine LOCATE. The one line to be corrected is indicated by the letter "C."

Effect on Previous Results

This correction has no effect on the airflow or temperature results for a tunnel system since the component of air drag is computed incorrectly only when the rear of the train is located outside the tunnel system. The rear-of-train component contributes only a small part of the total aerodynamic drag on a train. This correction may have a small effect on the train speed and location when a train is running outside the tunnel system; however, the effect of this revision is insignificant.

```
                C---- DIRECTION IS +                                          01400500
ISN 0190          260 TRNDLS(ISEG,NF) = XV(NUMV) - FSTS(JTS,IROUTE)           01400600
ISN 0191              TRNDLS(ISEG,NB) = TRNDLS(ISEG,NF) - LV(ITYP)            01400700
ISN 0192              GO TO 300                                               01400800
                C---- DIRECTION IS -                                          01400900
ISN 0193          270 TRNDLS(ISEG,NB) = FSTS(JTS,IROUTE) - XV(NUMV) + LLS(ISEG) 01401000
ISN 0194              TRNDLS(ISEG,NF) = TRNDLS(ISEG,NB) + LV(ITYP)            01401100
                C                                                             01401200
                C---- GET NEW SEGMENT NUMBER AND DIRECTION                   01401300
ISN 0195          300 ISEG=NSEGTS(JTS,IROUTE)                                 01401400
ISN 0196              ISEG=IABS(ISEG)                                         01401500
                C---- CHECK IF OUTSIDE OF TUNNEL SYSTEM                       01401600
ISN 0197              IF(ISEG) 305,305,310                                    01401700
                C---- TRAIN IS OUTSIDE OF TUNNEL                              01401800
ISN 0198          305 IDIR = 0                                                01401900
ISN 0199              GO TO 350                                               01402000
                C---- TRAIN IS INSIDE TUNNEL SYSTEM                           01402100
ISN 0200          310 IDIR = NSEGTS(JTS,IROUTE) / ISEG                        01402200
ISN 0201              NTRNLS(ISEG) = NTRNLS(ISEG) + 1                         01402300
ISN 0202              NTRN = NTRNLS(ISEG)                                     01402400
ISN 0203              NF = 2 * NTRN                                           01402500
ISN 0204              NB = NF - 1                                             01402600
                C---- CHECK IF GREATER THAN MAXIMUM NUMBER OF TRAINS ALLOWED IN SEGMENT 01402700
                C----     LIMITED BY ARRAY SIZE ('TRNNLS','TRNDLS') TO 'LMTRSG' TRAINS 01402800
ISN 0205              IF( NTRN - LMTRSG ) 320,320,800                         01402900
                C---- STORE TRAIN NUMBER WITH SEGMENT                         01403000
ISN 0206          320 TRNNLS(ISEG,NTRN)= IDIR * NUMV                          01403100
                C---- COMPUTE LENGTH OF TRAIN IN THIS TRACK SECTION            01403200
ISN 0207          350 TNL1 = FSTS(JTS,IROUTE) - FSTS(JTS-1,IROUTE)            01403300
ISN 0208              GO TO 200                                               01403400
                C                                                             01403500
                C                                                             01403600
                C---- BEGINNING OF TRACK SECTION ARRAY - REMAINDER OF TRAIN   01403700
                C---- HAS NOT ENTERED SYSTEM YET                               01403800
ISN 0209          360 IF( IDIR ) 380,385,370                                  01403900
                C---- DIRECTION IS +                                          01404000
ISN 0210          370 TRNDLS(ISEG,NF) = XV(NUMV) - FSTS(JTS,IROUTE)           01404100
ISN 0211              TRNDLS(ISEG,NB) = TRNDLS(ISEG,NF) - LV(ITYP)            01404200
ISN 0212              GO TO 385                                               01404300
                C---- DIRECTION IS -                                          01404400
ISN 0213          380 TRNDLS(ISEG,NB) = FSTS(JTS,IROUTE) - XV(NUMV) + LLS(ISEG) 01404500
ISN 0214              TRNDLS(ISEG,NF) = TRNDLS(ISEG,NB) + LV(ITYP)            01404600
ISN 0215          385 TNL1 = LV(ITYP) - SUM                                   01404700
                C---- COMPUTE DRAG ON TRAIN SIDE 'TNL1' AND REAR OF TRAIN     01404800
ISN 0216          390 DRAGV(NUMV)=DRAGV(NUMV)+(LAMDAV(ITYP)*TNL1/(8.0*AV(ITYP))+ 01404900
                    1 CDBVOV(ITYP) /2.0 ) * UV(NUMV)* UV(NUMV)                01405000 ← C
ISN 0217              GO TO 600                                               01405100
                C                                                             01405200
                C                                                             01405300
                C---- REAR OF TRAIN HAS BEEN PASSED - COMPUTE REMAINING PORTION OF TRAIN 01405400
ISN 0218          400 TNL1 = LV(ITYP) - SUM                                   01405500
ISN 0219              RG = RG + TNL1 * GRDTS(JTS,IROUTE)                      01405600
ISN 0220              IF( RADTS(JTS,IROUTE) ) 420,420,410                     01405700
ISN 0221          410 RC = RC + TNL1 / RADTS(JTS,IROUTE)                      01405800
ISN 0222          420 IF( ISEG ) 390,390,480                                  01405900
```

August 12, 1977

SUBWAY ENVIRONMENT SIMULATION (SES) COMPUTER PROGRAM

REVISION NO. 13 TO VERSION 2

Problem

Fans were not active during the first cycle of simulation (time = 0.0 seconds) when the Simulation Time After Which Fan Switches On on Input Form 5C is entered as 0.

Symptoms

When a system containing fans is initialized at the steady-state airflow rates with fans operating from time zero and zero run-up time, the airflows are observed to decay for the first aerodynamic cycle. The fans became active during the second cycle, sometimes producing a large acceleration in the airflows. As a result of these airflow perturbations, it was sometimes necessary to use a smaller aerodynamic time increment for the entire simulation than would otherwise be necessary.

Correction

See the attached partial listing of subroutine VSINS. The three corected lines of code are indicated by the letter "C." The two lines of code which were inserted are indicated by the letter "I."

Effect on Previous Results

This revision may produce slightly different airflow values during the first few seconds of a simulation in which fans that become active at time zero are used. The remainder of the simulation results are not affected.

```
ISN 0204          TNSS = TNSS + NSS                                    02799700
ISN 0205          TABL6(IVS) = TNSS                                    02799800
ISN 0206          DO 114 ISS = ISSL,TNSS                               02799900
ISN 0207      114 TABL7(ISS) = -IVS                                    02800000
ISN 0208          CALL CHECKI( TNSS, 1, LMSS, 43 )                     02800100
ISN 0209          GO TO ( 990, 120 ), NEW                              02800200
ISN 0210      120 WRITE(OUT,58) AGVS(IVS)                              02800300
ISN 0211          CALL CHECKR( AGVS(IVS), 3.0, 3000.0, 38 )            02800400
ISN 0212          WRITE(OUT,59) VOMXVS(IVS)                            02800500
ISN 0213          CALL CHECKR( VOMXVS(IVS), 0.0, 6000.0, 169 )         02800600
ISN 0214          VOMXVS(IVS) = VOMXVS(IVS) / 60.0                     02800700
ISN 0215          WRITE(OUT,61) DUMY3                                  02800800
ISN 0216          CALL CHECKR(DUMY3,0.0,130.0,23)                      02800900
ISN 0217          WRITE(OUT,62) DUMY4                                  02801000
ISN 0218          CALL CHECKR( DUMY4, 0.0, 130.0, 24 )                 02801100
ISN 0219          WRITE(OUT,63) DUMY5                                  02801200
ISN 0220          CALL CHECKR( DUMY5, 0.0, DUMY4, 25 )                 02801300
ISN 0221          WRITE(OUT,64) STAKVS(IVS)                            02801400
ISN 0222          CALL CHECKR( STAKVS(IVS), 0.0, 1000.0, 37 )          02801500
ISN 0223          CALL LATENT( DUMY4, DUMY5, DUMY6 )                   02801600
            C---- LOOP OVER SUBSEGMENTS IN VENT SHAFT                  02801700
ISN 0224          DO  130  ISS = ISSL, TNSS                            02801800
ISN 0225          QFRTSS(ISS) = 0.0                                    02801900
ISN 0226          QFRHSS(ISS) = 0.0                                    02802000
ISN 0227          LHLTSS(ISS) = 0.0                                    02802100
ISN 0228          SHLTSS(ISS) = 0.0                                    02802200
ISN 0229          SHUXSS(ISS) = 0.0                                    02802210
ISN 0230          FFSS(ISS) = 0.0                                      02802220
ISN 0231          FBSS(ISS) = 0.0                                      02802230
ISN 0232          HTRNSS(ISS) = 0.0                                    02802240
ISN 0233          TSFSS(ISS) = DUMY3                                   02802300
ISN 0234          TDBSS(ISS) = DUMY4                                   02802400
ISN 0235          TTMPSS(ISS) = DUMY4                                  02802500
ISN 0236          TWBSS(ISS) = DUMY5                                   02802600
ISN 0237          HUMSS(ISS) = DUMY6                                   02802700
ISN 0238      130 HTMPSS(ISS) = DUMY6                                  02802800
            C                                                          02802900
            C---- FAN INFORMATION              FORM 5C                02803000
ISN 0239          IF( NFNTYP ) 151,151,132                             02803100
ISN 0240      132 READ(IN,20) DUMY1,DUMY2,DUMY3,DUMY4                  02803200
ISN 0241          FTYPVS(IVS) = DUMY1                                  02803300
ISN 0242          IF( FTYPVS(IVS) ) 155,150,155                        02803400
ISN 0243      150 WRITE(OUT,66) FTYPVS(IVS)                            02803500
ISN 0244      151 FTYPVS(IVS) = 0                                      02803600
ISN 0245          FDIRVS(IVS) = 0.0                                    02803700
ISN 0246          FTONVS(IVS) = 0                                      02803800
ISN 0247          FTOFVS(IVS) = 0                                      02803900
ISN 0248          GO TO 170                                            02804000
ISN 0249      155 WRITE(OUT,65) FTYPVS(IVS)                            02804100
ISN 0250          IF( FTYPVS(IVS) - NFNTYP ) 157,157,156               02804200
ISN 0251      156 CALL ERROR( 170 )                                    02804300
ISN 0252      157 IF( TYPVS(IVS) - 2 ) 160,158,160                     02804400
ISN 0253      158 CALL ERROR( 171 )                                    02804500
ISN 0254      160 FTONVS(IVS) = DUMY2                                  02804600
ISN 0255          FTOFVS(IVS) = DUMY3                                  02804700
```

```
ISN 0256          WRITE(OUT,68) FTONVS(IVS)                                  02804800
ISN 0257          WRITE(OUT,69) FTOFVS(IVS)                                  02804900
ISN 0258          IF( FTONVS(IVS) - FTOFVS(IVS) )162,162,161                 02805000 <------- C
ISN 0259      161 CALL ERROR( 76 )                                           02805100
ISN 0260      162 FTONVS(IVS) = FTONVS(IVS) * 100                            02805200 <------- C
ISN 0261          IF( FTONVS(IVS) ) 164,164,163                              02805210 <---I
ISN 0262      163 FTONVS(IVS) = FTONVS(IVS) + 1                              02805220 <---I
ISN 0263      164 FTOFVS(IVS) = FTOFVS(IVS) * 100                            02805300 <------- C
ISN 0264          NUMY1 = DUMY4                                              02805400
ISN 0265          IF( NUMY1 ) 166,165,165                                    02805500
ISN 0266      165 WRITE(OUT,70) NUMY1                                        02805600
ISN 0267          FDIRVS(IVS) = 1.0                                          02805700
ISN 0268          GO TO 167                                                  02805800
ISN 0269      166 WRITE(OUT,71) NUMY1                                        02805900
ISN 0270          FDIRVS(IVS) = -1.0                                         02806000
            C---- DETERMINE SIGN OF OUTFLOW OR EXHAUST                       02806100
ISN 0271      167 NODE = TABL12( ISCT )                                      02806200
ISN 0272          IF( TABL16( NODE ) - 1 ) 170,168,170                       02806300
            C --  BACKWARD END IS CONNECTED TO ATMOSPHERE - REVERSE DIRECTION SIGN  02806400
ISN 0273      168 FDIRVS(IVS) = - FDIRVS(IVS)                                02806500
            C                                                                02806600
            C---- SEGMENT CHARACTERISITCS - COMPUTE EQUIVALENT VENT SHAFT   FORM 50 02806700
ISN 0274      170 WRITE(OUT,75)                                              02806800
ISN 0275          CEPS(ISCT) = 0.0                                           02806900
ISN 0276          CENS(ISCT) = 0.0                                           02807000
ISN 0277          X3 = 0.0                                                   02807100
ISN 0278          X4 = 0.0                                                   02807200
ISN 0279          X5 = 0.0                                                   02807300
ISN 0280          X6 = 0.0                                                   02807400
            C---- READ SEGMENT PROPERTIES AND COMPUTE SUMMATIONS              02807500
ISN 0281          DO  240  ISEG = 1, NVSEG                                   02807600
ISN 0282          READ(IN,20) DUMY1,DUMY2, DUMY3, DUMY4, DUMY5, DUMY6, DUMY7 02807700
ISN 0283          WRITE(OUT,77) ISEG,DUMY1,DUMY2,DUMY3,DUMY4,DUMY5,DUMY6,DUMY7 02807800
            C --  LENGTH                                                     02807900
ISN 0284          CALL CHECKR( DUMY1, 0.0, 2000.0, 40 )                      02808000
            C --  AREA                                                       02808100
ISN 0285          CALL CHECKR( DUMY2, 3.0, 3000.0, 38 )                      02808200
            C --  PERIMETER                                                  02808300
ISN 0286          CALL CHECKR( DUMY3, 5.0, 500.0, 39 )                       02808400
            C --  FORWARD POSITIVE                                           02808500
ISN 0287          CALL CHECKR( DUMY4, 0.0, 300.0, 28 )                       02808600
            C --  FORWARD NEGATIVE                                           02808700
ISN 0288          CALL CHECKR( DUMY5, 0.0, 300.0, 28 )                       02808800
            C --  BACKWARD POSITIVE                                          02808900
ISN 0289          CALL CHECKR( DUMY6, 0.0, 300.0, 28 )                       02809000
            C --  BACKWARD NEGATIVE                                          02809100
ISN 0290          CALL CHECKR( DUMY7, 0.0, 300.0, 28 )                       02809200
ISN 0291          DUMY8 = (4.0*PI*DUMY2)**0.5                                02809300
ISN 0292          IF( DUMY3 - DUMY8 ) 153,180,180                            02809400
ISN 0293      153 CALL ERROR( 70 )                                           02809500
            C                                                                02809600
ISN 0294      180 IF(ISEG-1) 185,185,190                                     02809700
ISN 0295      185 ALOWS(ISCT) = DUMY2                                        02809800
ISN 0296      190 IF(NVSEG-ISEG) 195,195,200                                 02809900
ISN 0297      195 AHIGHS(ISCT) = DUMY2                                       02810000
```

August 12, 1977

SUBWAY ENVIRONMENT SIMULATION (SES) COMPUTER PROGRAM

REVISION NO. 14 TO VERSION 2

Problem

The severity of the error types was revised.

Symptoms

The following error type was changed from a fatal error (which terminates all processing) to a non-fatal error:

Error Type 159

The deep sink temperature is less than 0 or greater than 100 deg F.

The following error type was changed from a non-fatal error to a fatal error:

Error Type 124

This section has not been defined.

The SES version number is revised to "Version 2.14."

Correction

See the attached partial listing of subroutine ERROR. The two lines of code to be changed are indicated by the letter "C."

See the attached partial listing of subroutine INPUT. The one line of code to be changed is indicated by the letter "C."

Effect on Previous Results

None.

```
ISN 0574          GO TO 500                                    00570200
ISN 0575      104 WRITE(OUT,604)                               00570300
ISN 0576          GO TO 500                                    00570400
ISN 0577      105 WRITE(OUT,605)                               00570500
ISN 0578          GO TO 500                                    00570600
ISN 0579      106 WRITE(OUT,606)                               00570700
ISN 0580          GO TO 500                                    00570800
ISN 0581      107 WRITE(OUT,607)                               00570900
ISN 0582          GO TO 500                                    00571000
ISN 0583      108 WRITE(OUT,608)                               00571100
ISN 0584          GO TO 500                                    00571200
ISN 0585      109 WRITE(OUT,609)                               00571300
ISN 0586          GO TO 500                                    00571400
ISN 0587      110 WRITE(OUT,610)                               00571500
ISN 0588          GO TO 500                                    00571600
ISN 0589      111 WRITE(OUT,611)                               00571700
ISN 0590          GO TO 500                                    00571800
ISN 0591      112 WRITE(OUT,612)                               00571900
ISN 0592          GO TO 500                                    00572000
ISN 0593      113 WRITE(OUT,613)                               00572100
ISN 0594          GO TO 499                                    00572200
ISN 0595      114 WRITE(OUT,614)                               00572300
ISN 0596          GO TO 500                                    00572400
ISN 0597      115 WRITE(OUT,615)                               00572500
ISN 0598          GO TO 500                                    00572600
ISN 0599      116 WRITE(OUT,616)                               00572700
ISN 0600          GO TO 500                                    00572800
ISN 0601      117 WRITE(OUT,617)                               00572900
ISN 0602          GO TO 500                                    00573000
ISN 0603      118 WRITE(OUT,618)                               00573100
ISN 0604          GO TO 500                                    00573200
ISN 0605      119 WRITE(OUT,619)                               00573300
ISN 0606          GO TO 500                                    00573400
ISN 0607      120 WRITE(OUT,620)                               00573500
ISN 0608          GO TO 500                                    00573600
ISN 0609      121 WRITE(OUT,621)                               00573700
ISN 0610          GO TO 500                                    00573800
ISN 0611      122 WRITE(OUT,622)                               00573900
ISN 0612          GO TO 500                                    00574000
ISN 0613      123 WRITE(OUT,623)                               00574100
ISN 0614          GO TO 499                                    00574200
ISN 0615      124 WRITE(OUT,624)                               00574300
ISN 0616          GO TO 499                                    00574400 <------ C
ISN 0617      125 WRITE(OUT,625)                               00574500
ISN 0618          GO TO 500                                    00574600
ISN 0619      126 WRITE(OUT,626)                               00574700
ISN 0620          GO TO 499                                    00574800
ISN 0621      127 WRITE(OUT,627) LMSECT                        00574900
ISN 0622          GO TO 499                                    00575000
ISN 0623      128 WRITE(OUT,628)                               00575100
ISN 0624          GO TO 500                                    00575200
ISN 0625      129 WRITE(OUT,629)                               00575300
ISN 0626          GO TO 500                                    00575400
ISN 0627      130 WRITE(OUT,630)                               00575500
ISN 0628          GO TO 500                                    00575600
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ISN 0629        131 WRITE(OUT,631)                                  00575700
ISN 0630            GO TO 499                                       00575800
ISN 0631        132 WRITE(OUT,632) LMUL                             00575900
ISN 0632            GO TO 499                                       00576000
ISN 0633        133 WRITE(OUT,633) LMCNTP                           00576100
ISN 0634            GO TO 499                                       00576200
ISN 0635        134 WRITE(OUT,634)                                  00576300
ISN 0636            GO TO 499                                       00576400
ISN 0637        135 WRITE(OUT,635) LMTRBT                           00576500
ISN 0638            GO TO 499                                       00576600
ISN 0639        136 WRITE(OUT,636)                                  00576700
ISN 0640            GO TO 499                                       00576800
ISN 0641        137 WRITE(OUT,637) LMTRTP                           00576900
ISN 0642            GO TO 499                                       00577000
ISN 0643        138 WRITE(OUT,638)                                  00577100
ISN 0644            GO TO 500                                       00577200
ISN 0645        139 WRITE(OUT,639)                                  00577300
ISN 0646            GO TO 500                                       00577400
ISN 0647        140 WRITE(OUT,640)                                  00577500
ISN 0648            GO TO 500                                       00577600
ISN 0649        141 WRITE(OUT,641) LMTRAN                           00577700
ISN 0650            GO TO 499                                       00577800
ISN 0651        142 WRITE(OUT,642)                                  00577900
ISN 0652            GO TO 500                                       00578000
ISN 0653        143 WRITE(OUT,643)                                  00578100
ISN 0654            GO TO 500                                       00578200
ISN 0655        144 WRITE(OUT,644)                                  00578300
ISN 0656            GO TO 500                                       00578400
ISN 0657        145 WRITE(OUT,645)                                  00578500
ISN 0658            GO TO 500                                       00578600
ISN 0659        146 WRITE(OUT,646)                                  00578700
ISN 0660            GO TO 500                                       00578800
ISN 0661        147 WRITE(OUT,647)                                  00578900
ISN 0662            GO TO 500                                       00579000
ISN 0663        148 WRITE(OUT,648)                                  00579100
ISN 0664            GO TO 500                                       00579200
ISN 0665        149 WRITE(OUT,649)                                  00579300
ISN 0666            GO TO 500                                       00579400
ISN 0667        150 WRITE(OUT,650)                                  00579500
ISN 0668            GO TO 499                                       00579600
ISN 0669        151 WRITE(OUT,651)                                  00579700
ISN 0670            GO TO 500                                       00579800
ISN 0671        152 WRITE(OUT,652)                                  00579900
ISN 0672            GO TO 499                                       00580000
ISN 0673        153 WRITE(OUT,653) LMSCTX                           00580100
ISN 0674            GO TO 499                                       00580200
ISN 0675        154 WRITE(OUT,654) LMNODX                           00580300
ISN 0676            GO TO 499                                       00580400
ISN 0677        155 WRITE(OUT,655)                                  00580500
ISN 0678            GO TO 500                                       00580600
ISN 0679        156 WRITE(OUT,656)                                  00580700
ISN 0680            GO TO 499                                       00580800
ISN 0681        157 WRITE(OUT,657)                                  00580900
ISN 0682            GO TO 499                                       00581000
ISN 0683        158 WRITE(OUT,658)                                  00581100
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ISN 0684            GO TO 499                                    00581200
ISN 0685        159 WRITE(OUT,659)                               00581300
ISN 0686            GO TO 500                                    00581400  <------ C
ISN 0687        160 WRITE(OUT,660)                               00581500
ISN 0688            GO TO 499                                    00581600
ISN 0689        161 WRITE(OUT,661)                               00581700
ISN 0690            GO TO 499                                    00581800
ISN 0691        162 WRITE(OUT,662)                               00581900
ISN 0692            GO TO 500                                    00582000
ISN 0693        163 WRITE(OUT,663)                               00582100
ISN 0694            GO TO 500                                    00582200
ISN 0695        164 WRITE(OUT,664)                               00582300
ISN 0696            GO TO 500                                    00582400
ISN 0697        165 WRITE(OUT,665)                               00582500
ISN 0698            GO TO 500                                    00582600
ISN 0699        166 WRITE(OUT,666)                               00582700
ISN 0700            GO TO 500                                    00582800
ISN 0701        167 WRITE(OUT,667)                               00582900
ISN 0702            GO TO 500                                    00583000
ISN 0703        168 WRITE(OUT,668)                               00583100
ISN 0704            GO TO 499                                    00583200
ISN 0705        169 WRITE(OUT,669)                               00583300
ISN 0706            GO TO 500                                    00583400
ISN 0707        170 WRITE(OUT,670)                               00583500
ISN 0708            GO TO 500                                    00583600
ISN 0709      171   WRITE(OUT,671)                               00583700
ISN 0710            GO TO 500                                    00583800
ISN 0711      172   WRITE(OUT,672)                               00583900
ISN 0712            GO TO 499                                    00584000
ISN 0713      173   WRITE(OUT,673)                               00584100
ISN 0714            GO TO 500                                    00584200
ISN 0715      174   WRITE(OUT,674)                               00584300
ISN 0716            GO TO 500                                    00584400
ISN 0717      175   WRITE(OUT,675)                               00584500
ISN 0718            GO TO 500                                    00584600
ISN 0719        176 WRITE(OUT,676)                               00584700
ISN 0720            GO TO 500                                    00584800
ISN 0721        177 WRITE(OUT,677)                               00584900
ISN 0722            GO TO 500                                    00585000
ISN 0723        178 WRITE(OUT,678)                               00585100
ISN 0724            GO TO 500                                    00585200
ISN 0725        179 WRITE(OUT,679) LMTHND                        00585300
ISN 0726            GO TO 499                                    00585400
ISN 0727        180 WRITE(OUT,680)                               00585500
ISN 0728            GO TO 499                                    00585600
ISN 0729        181 WRITE(OUT,681)                               00585700
ISN 0730            GO TO 499                                    00585800
ISN 0731        182 WRITE(OUT,682)                               00585900
ISN 0732            GO TO 499                                    00586000
ISN 0733        183 WRITE(OUT,683)                               00586100
ISN 0734            GO TO 499                                    00586200
ISN 0735        184 WRITE(OUT,684)                               00586300
ISN 0736            GO TO 500                                    00586400
ISN 0737        185 WRITE(OUT,685)                               00586500
ISN 0738            GO TO 500                                    00586600
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ISN 0153    70   FORMAT (25X,17A4,A2,////)                                    01056700
ISN 0154    80   FORMAT (1H ,36X,'DESIGN TIME',I5,' HRS',3X,2A4,I6,///)       01056800
ISN 0155    90   FORMAT (1H ,39X,'DESIGN TIME 0',I3,' HRS',3X,2A4,I6,/)       01056900
ISN 0156   100   FORMAT (1H ,56X,8A1,//T95,'PREPARED BY -'//,T97,'PARSONS, BRINCKER01057000
                1HOFF,',/,T97,'QUADE AND DOUGLAS, INC.',/,T97,'NEW YORK, NEW YORK',01057100
                2/,T97,'VERSION 2.14')                                          01057200  ← C
ISN 0157   110   FORMAT (1H0,T45,'INPUT VERIFICATION OF GENERAL DATA')          01057300
ISN 0158   120   FORMAT (1H0,T113,'FORM 1C'/T30,'TRAIN PERFORMANCE OPTION',T80,I5,T01057400
                190,'BYPASS')                                                   01057500
ISN 0159   130   FORMAT (1H0,T113,'FORM 1C'/T30,'TRAIN PERFORMANCE OPTION',T80,I5,T01057600
                190,'IMPLICIT')                                                 01057700
ISN 0160   140   FORMAT (1H0,T113,'FORM 1C'/T30,'TRAIN PERFORMANCE OPTION',T80,I5,T01057800
                190,'EXPLICIT (HEAT REJ. COMPUTED)')                            01057900
ISN 0161   150   FORMAT (1H0,T113,'FORM 1C'/T30,'TRAIN PERFORMANCE OPTION',T80,I5,T01058000
                190,'EXPLICIT (HEAT REJ. INPUT)')                               01058100
ISN 0162   160   FORMAT (1H0,T30,'TEMPERATURE / HUMIDITY SIMULATION OPTION',T80,I5,01058200
                1T90,'BYPASS')                                                  01058300
ISN 0163   170   FORMAT (1H0,T30,'TEMPERATURE / HUMIDITY SIMULATION OPTION',T80,I5,01058400
                1T90,'YES')                                                     01058500
ISN 0164   180   FORMAT (1H0,T30,'TEMPERATURE / HUMIDITY SIMULATION OPTION',T80,I5,01058600
                1T90,'YES - EVAPORATION')                                       01058700
ISN 0165   190   FORMAT (1H0,T30,'HUMIDITY DISPLAY OPTION',T80,I5,T90,'HUMIDITY RAT01058800
                1IO')                                                           01058900
ISN 0166   200   FORMAT (1H0,T30,'HUMIDITY DISPLAY OPTION',T80,I5,T90,'WET-BULB TEM01059000
                1PERATURE')                                                     01059100
ISN 0167   210   FORMAT (1H0,T30,'HUMIDITY DISPLAY OPTION',T80,I5,T90,'RELATIVE HUM01059200
                1IDITY')                                                        01059300
ISN 0168   220   FORMAT (1H0,T30,'ENVIRONMENTAL CONTROL LOAD EVALUATION OPTION',T8001059400
                1,I5,T90,'BYPASS')                                              01059500
ISN 0169   230   FORMAT (1H0,T30,'ENVIRONMENTAL CONTROL LOAD EVALUATION OPTION',T8001059600
                1,I5,T90,'YES')                                                 01059700
ISN 0170   240   FORMAT (1H0,T30,'ENVIRONMENTAL CONTROL LOAD EVALUATION OPTION',T8001059800
                1,I5,T90,'OFF-HOUR')                                            01059900
ISN 0171   250   FORMAT (1H0,T30,'HEAT SINK SUMMARY PRINT OPTION',T80,I5,T90,'BYPAS01060000
                1S')                                                            01060100
ISN 0172   260   FORMAT (1H0,T30,'HEAT SINK SUMMARY PRINT OPTION',T80,I5,T90,'YES')01060200
ISN 0173   270   FORMAT (1H0,T30,'SUPPLEMENTARY OUTPUT OPTION',T80,I5)          01060300
ISN 0174   280   FORMAT (1H0,T30,'ALLOWABLE SIMULATION ERRORS',T80,I5)          01060400
ISN 0175   290   FORMAT (1H0,T30,'ALLOWABLE INPUT ERRORS',T80,I5)               01060500
ISN 0176   300   FORMAT (1H0,T30,'ALLOWABLE INPUT ERRORS',T80,I5,T90,'NO SIMULATION01060600
                1')                                                             01060700
ISN 0177   310   FORMAT (/1H0,T30,'NUMBER OF LINE SEGMENTS',T80,I5,T113,'FORM 1D') 01060800
ISN 0178   320   FORMAT (1H0,T30,'TOTAL NUMBER OF SECTIONS',T80,I5)             01060900
ISN 0179   330   FORMAT (1H0,T30,'NUMBER OF VENTILATION SHAFT SECTIONS',T80,I5) 01061000
ISN 0180   340   FORMAT (1H0,T30,'NUMBER OF NODES',T80,I5)                      01061100
ISN 0181   350   FORMAT (1H0,T30,'NUMBER OF BRANCHED JUNCTIONS',T80,I5)         01061200
ISN 0182   360   FORMAT (1H0,T30,'NUMBER OF PORTALS',T80,I5)                    01061300
ISN 0183   370   FORMAT (1H0,T30,'NUMBER OF UNSTEADY HEAT SOURCES',T80,I5)      01061400
ISN 0184   380   FORMAT (1H0,T30,'NUMBER OF FAN TYPES',T80,I5)                  01061500
ISN 0185   390   FORMAT (1H0,T30,'NUMBER OF TRAIN ROUTES',T80,I5,T113,'FORM 1E') 01061600
ISN 0186   400   FORMAT (1H0,T30,'NUMBER OF TRAIN TYPES',T80,I5)               01061700
ISN 0187   410   FORMAT (1H0,T30,'NUMBER OF ENVIRONMENTAL CONTROL ZONES',T80,I5) 01061800
ISN 0188   420   FORMAT (1H0,T30,'FAN STOPPING/WINDMILLING OPTION',T80,I5)     01061900
ISN 0189   430   FORMAT (1H+,T90,'MEANINGLESS')                                 01062000
ISN 0190   440   FORMAT (1H+,T90,'SIMULATION TERMINATION')                      01062100
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SES SAMPLE PROBLEM

SAMPL 5

REVISED OUTPUT REFLECTING
REVISIONS THROUGH V2M14

TIME 990.00 SECONDS 2 TRAIN(S) ARE OPERATIONAL

TRAIN NO.	RTE	TYP	LOCATION (FEET)	SPEED (MPH)	ACCELERATION (MPH/SEC)	AIR DRAG (LBS)	COEF. OF AIR DRAG	TRACTIVE EFFORT (LBS/MOTOR)	MOTOR CURRENT (AMPS)	HORSEPOWER TOTAL	HORSEPOWER AIR DRAG	GRID TEMPERATURE ACCEL. (DEG F)	GRID TEMPERATURE DECEL. (DEG F)	POWER LOSS (BTU/SEC-FT)	HEAT REJECTION (BTU/SEC-FT)
21	1	1	2877.21	19.25	2.82	330.	3.70	2395.	307.	3933.	17.	276.0	740.1	2.361	2.281
22	2	1	2744.71	11.00	-2.51	-64.	-2.19	0.	0.	0.	-2.	241.6	751.3	3.421	1.986

LENGTH (FT)	SYSTEM PARTITIONING		SENSIBLE HEAT LOAD (BTU/SEC)	LATENT HEAT LOAD (BTU/SEC)	AIR TEMPERATURE (DEG F)	HUMIDITY RATIO (LB/LB)	AIR FLOW (CFM)	AIR VELOCITY (FPM)	TRAIN POSITION RTE 1	RTE 2	RTE 3	RTE 4	RTE 5	RTE 6
100.0	1 - 1	(TUNNEL)			WEST PORTAL TO 1100 FT - ROUTE 1									
	1 - 1 - 1		0.2	0.0	81.81	0.01648	96768.6	322.6						
100.0	1 - 2	(TUNNEL)			1100 TO 1200 FT - ROUTE 1									
	1 - 2 - 1		0.2	0.0	81.62	0.01648	96768.6	387.1						
400.0	1 - 3	(TUNNEL)			1200 TO 1600 FT - ROUTE 1									
	1 - 3 - 1		0.4	0.0	81.38	0.01648	96768.6	430.1						
	1 - 3 - 2		0.4	0.0	81.41	0.01648								
600.0	2 - 4	(TUNNEL)			PORTAL TO 1600 FT - ROUTE 2									
	2 - 4 - 1		6.2	0.0	84.39	0.01585	-233181.7	-1036.4						
	2 - 4 - 2		6.2	0.0	84.00	0.01586								
	2 - 4 - 3		6.2	0.0	83.58	0.01585								
110.0	3 -103	(VENTILATION SHAFT)			VENT SHAFT AT 1600 FT - ROUTE 1									
	3 -103 - 1				81.61	0.01648	20498.8	102.5						
95.1	4 -104	(VENTILATION SHAFT)			VENT SHAFT AT 1600 FT - ROUTE 2									
	4 -104 - 1				81.81	0.01647	-49208.6	-370.8						
600.0	5 - 5	(TUNNEL)			1600 TO 2200 FT(START OF STA) -RTE 1									
	5 - 5 - 1		0.4	0.0	81.67	0.01648	76269.8	339.0						
	5 - 5 - 2		0.4	0.0	81.97	0.01648								
	5 - 5 - 3		0.4	0.0	82.54	0.01648								
600.0	6 - 6	(TUNNEL)			1600 TO 2200 FT(START OF STA)- RTE 2									
	6 - 6 - 1		5.9	0.0	83.22	0.01561	-183973.1	-817.7						
	6 - 6 - 2		5.9	0.0	82.03	0.01523								
	6 - 6 - 3		5.9	0.0	80.76	0.01470								

2

100.0	7 - 7	(STATION)			START OF STATION TO WEST STAIRWAY					
	7 - 7 - 1		-234.6	-294.9	78.03	0.01322	-107703.3	-153.9		22
200.0	8 - 8	(STATION)			WEST END OF MEZZANINE TO STREET EXIT					
	8 - 8 - 1		2.5	-4.2	79.94	0.01412	-35432.3	-78.7		
	8 - 8 - 2		-3.1	-45.6	80.40	0.01414				
400.0	9 - 9	(STATION)			PLATFORM AREA BETWEEN STAIRWAYS					
	9 - 9 - 1		165.0	-9.7	80.16	0.01414	-72270.9	-103.2	21	22
	9 - 9 - 2		210.7	8.4	80.20	0.01410			21	22
	9 - 9 - 3		202.1	5.6	79.78	0.01402			21	22
	9 - 9 - 4		181.6	4.0	79.41	0.01397			21	22
20.0	10 -110	(STAIRWAY)			STREET LEVEL STAIRWAY TO MEZZANINE					
	10 -110 - 1				81.11	0.01542	-30769.7	-318.9		
200.0	11 - 10	(STATION)			STREET EXIT TO EAST END OF MEZZANINE					
	11 - 10 - 1		-4.0	-47.2	80.00	0.01377	-4662.6	-10.4		
	11 - 10 - 2		5.5	0.8	79.27	0.01395				
100.0	12 - 11	(STATION)			EAST STAIRWAY TO END OF STATION					
	12 - 11 - 1		153.1	-9.1	80.21	0.01393	-76933.6	-109.9	21	22
500.0	13 - 12	(TUNNEL)			STATION END TO EXHAUST FAN AT 3300FT					
	13 - 12 - 1		211.2	0.0	86.32	0.01407	-76933.6	-192.3	21	22
	13 - 12 - 2		4.7	0.0	88.15	0.01441				
	13 - 12 - 3		4.7	0.0	89.46	0.01512				
78.7	14 -114	(VENTILATION SHAFT)			FAN SHAFT AT 3300 FT - EXHAUST MODE					
	14 -114 - 1				89.06	0.01597	140738.2	938.0		
400.0	15 - 13	(TUNNEL)			EXHAUST FAN TO 3700 FT					
	15 - 13 - 1		5.8	0.0	88.92	0.01612	-217671.8	-544.2		
	15 - 13 - 2		5.8	0.0	87.01	0.01636				
300.0	15 - 14	(TUNNEL)			3700 FT TO EAST PORTAL AT 4000 FT					
	15 - 14 - 1		4.3	0.0	85.18	0.01644	-217671.8	-311.0		
	15 - 14 - 2		4.3	0.0	83.19	0.01647				

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(TUNNEL) WEST PORTAL TO 1100 FT - ROUTE 1 FROM NODE 1 TO NODE 3

LENGTH 100.0 FT
AREA 300.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	1 - 1	587507.	930.0	95718.	906.0	200865.	0.
AIR VELOCITY	(FPM)	1 - 1	1958.	930.0	319.	906.0	670.	0.
AIR FLOW DIRECTION	(PERCENT)	1 - 1					100.0	0.0
DRY-BULB TEMPERATURE	(DEG F)	1 - 1 - 1	85.7	930.0	81.8	922.0	82.1	0.0
HUMIDITY RATIO	(LB/LB)	1 - 1 - 1	0.0165	900.0	0.0165	900.0	0.0165	

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	76090.6	BTU/HR
STEADY-STATE HEAT SOURCES	700.0	BTU/HR
HEAT SINK	-43539.2	BTU/HR

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(TUNNEL) 1100 TO 1200 FT - ROUTE 1 FROM NODE 1 TO NODE 3

LENGTH 100.0 FT
AREA 250.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	1 - 2	587507.	930.0	95718.	906.0	200865.	0.
AIR VELOCITY	(FPM)	1 - 2	2350.	930.0	383.	906.0	803.	0.
AIR FLOW DIRECTION	(PERCENT)	1 - 2					100.0	0.0
DRY-BULB TEMPERATURE	(DEG F)	1 - 2 - 1	86.8	930.0	81.6	923.0	82.1	0.0
HUMIDITY RATIO	(LB/LB)	1 - 2 - 1	0.0165	900.0	0.0165	900.0	0.0165	

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	73981.4	BTU/HR
STEADY-STATE HEAT SOURCES	700.0	BTU/HR
HEAT SINK	-47824.8	BTU/HR

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(TUNNEL) 1200 TO 1600 FT - ROUTE 1 FROM NODE 1 TO NODE 3

LENGTH 400.0 FT
AREA 225.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	1 - 3	587507.	930.0	95718.	906.0	200865.	0.
AIR VELOCITY	(FPM)	1 - 3	2611.	930.0	425.	906.0	893.	0.
AIR FLOW DIRECTION	(PERCENT)	1 - 3					100.0	0.0
DRY-BULB TEMPERATURE	(DEG F)	1 - 3 - 1	88.0	932.0	81.3	924.0	82.4	0.0
		1 - 3 - 2	87.9	935.0	81.1	926.0	82.7	0.0
HUMIDITY RATIO	(LB/LB)	1 - 3 - 1	0.0165	900.0	0.0165	900.0	0.0165	
		1 - 3 - 2	0.0165	900.0	0.0165	936.0	0.0165	

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	298991.9	BTU/HR
STEADY-STATE HEAT SOURCES	2800.0	BTU/HR
HEAT SINK	-216768.9	BTU/HR

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(TUNNEL) PORTAL TO 1600 FT - ROUTE 2 FROM NODE 2 TO NODE 4

LENGTH 600.0 FT
AREA 225.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	2 - 4	-82104.	928.0	-582130.	960.0	0.	-223626.
AIR VELOCITY	(FPM)	2 - 4	-365.	928.0	-2587.	960.0	0.	-994.
AIR FLOW DIRECTION	(PERCENT)	2 - 4					0.0	100.0
DRY-BULB TEMPERATURE	(DEG F)	2 - 4 - 1	88.7	964.0	81.9	956.0	0.0	84.1
		2 - 4 - 2	89.4	962.0	81.8	954.0	0.0	83.8
		2 - 4 - 3	88.8	960.0	81.7	951.0	0.0	83.5
HUMIDITY RATIO	(LB/LB)	2 - 4 - 1	0.0159	966.0	0.0158	961.0	0.0159	
		2 - 4 - 2	0.0159	936.0	0.0157	961.0	0.0159	
		2 - 4 - 3	0.0161	928.0	0.0156	952.0	0.0158	

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	501021.3	BTU/HR
STEADY-STATE HEAT SOURCES	61199.9	BTU/HR
HEAT SINK	-484219.1	BTU/HR

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(VENTILATION SHAFT) VENT SHAFT AT 1600 FT - ROUTE 1 FROM NODE 3 TO NODE 50

LENGTH 110.0 FT
AREA 200.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	3 -103	293913.	929.0	-128151.	937.0	25307.	-44189.
AIR VELOCITY	(FPM)	3 -103	1470.	929.0	-641.	937.0	127.	-221.
AIR FLOW DIRECTION	(PERCENT)	3 -103					37.4	62.6
PERCENTAGE OF TIME OUTFLOW VELOCITY EXCEEDS 1000.0 FPM		3 -103					6.6	
DRY-BULB TEMPERATURE	(DEG F)	3 -103 - 1	81.8	968.0	81.4	931.0	81.6	81.7
HUMIDITY RATIO	(LB/LB)	3 -103 - 1	0.0165	963.0	0.0165	932.0	0.0165	

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(VENTILATION SHAFT) VENT SHAFT AT 1600 FT - ROUTE 2 FROM NODE 4 TO NODE 51

LENGTH 95.1 FT
AREA 132.7 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	4 -104	136778.	951.0	-295975.	960.0	13681.	-61571.
AIR VELOCITY	(FPM)	4 -104	1031.	951.0	-2230.	960.0	103.	-464.
AIR FLOW DIRECTION	(PERCENT)	4 -104					25.3	74.7
PERCENTAGE OF TIME OUTFLOW VELOCITY EXCEEDS 1000.0 FPM		4 -104					9.9	
DRY-BULB TEMPERATURE	(DEG F)	4 -104 - 1	81.8	964.0	81.6	950.0	81.7	81.8
HUMIDITY RATIO	(LB/LB)	4 -104 - 1	0.0165	931.0	0.0156	952.0	0.0163	

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(TUNNEL) 1600 TO 2200 FT(START OF STA) -PTF 1 FROM NODE 3 TO NODE 5

LENGTH 600.0 FT
AREA 225.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	5 - 5	500073.	935.0	62998.	983.0	219747.	0.
AIR VELOCITY	(FPM)	5 - 5	2223.	935.0	280.	983.0	977.	0.
AIR FLOW DIRECTION	(PERCENT)	5 - 5					100.0	0.0
DRY-BULB TEMPERATURE	(DEG F)	5 - 5 - 1	87.6	937.0	81.1	929.0	82.7	0.0
		5 - 5 - 2	89.0	940.0	81.0	931.0	83.1	0.0
		5 - 5 - 3	90.4	944.0	81.0	933.0	83.7	0.0
HUMIDITY RATIO	(LB/LB)	5 - 5 - 1	0.0165	951.0	0.0165	900.0	0.0165	
		5 - 5 - 2	0.0165	963.0	0.0165	900.0	0.0165	
		5 - 5 - 3	0.0165	953.0	0.0165	900.0	0.0165	

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	561485.6	BTU/HR
STEADY-STATE HEAT SOURCES	4200.0	BTU/HR
HEAT SINK	-418783.8	BTU/HR

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(TUNNEL) 1600 TO 2200 FT(START OF STA)- RTE 2 FROM NODE 4 TO NODE 5

LENGTH 600.0 FT
AREA 225.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	6 - 6	-415.	920.0	-347433.	952.0	0.	-175736.
AIR VELOCITY	(FPM)	6 - 6	-2.	920.0	-1544.	952.0	0.	-781.
AIR FLOW DIRECTION	(PERCENT)	6 - 6					0.0	100.0
DRY-BULB TEMPERATURE	(DEG F)	6 - 6 - 1	88.2	958.0	81.5	947.0	0.0	83.7
		6 - 6 - 2	89.4	956.0	81.2	941.0	0.0	83.3
		6 - 6 - 3	90.0	952.0	80.6	904.0	0.0	82.9
HUMIDITY RATIO	(LB/LB)	6 - 6 - 1	0.0158	977.0	0.0153	943.0	0.0155	
		6 - 6 - 2	0.0160	971.0	0.0151	910.0	0.0154	
		6 - 6 - 3	0.0162	967.0	0.0147	901.0	0.0154	

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	622781.8	BTU/HR
STEADY-STATE HEAT SOURCES	61199.9	BTU/HR
HEAT SINK	-419917.9	BTU/HR

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(STATION) START OF STATION TO WEST STAIRWAY FROM NODE 5 TO NODE 6

LENGTH 100.0 FT
AREA 700.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	7 - 7	362812.	934.0	-185586.	977.0	89416.	-45404.
AIR VELOCITY	(FPM)	7 - 7	518.	934.0	-265.	977.0	128.	-65.
AIR FLOW DIRECTION	(PERCENT)	7 - 7					49.5	50.5
DRY-BULB TEMPERATURE	(DEG F)	7 - 7 - 1	84.5	952.0	76.6	913.0	78.6	80.5
HUMIDITY RATIO	(LB/LB)	7 - 7 - 1	0.0149	952.0	0.0127	910.0	0.0138	

PERCENTAGE OF TIME TEMPERATURE IS ABOVE

	70.0	75.0	80.0	85.0	90.0	95.0
7 - 7 - 1	100.0	100.0	38.5	0.0	0.0	0.0

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	692956.1	BTU/HR
STEADY-STATE HEAT SOURCES	70000.4	BTU/HR
ENVIRONMENTAL CONTROL SYSTEM	-1234364.0	BTU/HR
HEAT SINK	-3776.7	BTU/HR
UNDERPLATFORM EXHAUST SYSTEM	0.0	BTU/HR

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(STATION) WEST END OF MEZZANINE TO STREET EXIT FROM NODE 6 TO NODE 7

LENGTH 200.0 FT
AREA 450.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	8 - 8	97627.	932.0	-101546.	949.0	17405.	-19426.
AIR VELOCITY	(FPM)	8 - 8	217.	932.0	-226.	949.0	39.	-43.
AIR FLOW DIRECTION	(PERCENT)	8 - 8					56.0	44.0
DRY-BULB TEMPERATURE	(DEG F)	8 - 8 - 1	80.1	923.0	79.5	940.0	79.9	79.8
		8 - 8 - 2	80.7	964.0	80.1	941.0	80.4	80.4
HUMIDITY RATIO	(LB/LB)	8 - 8 - 1	0.0141	965.0	0.0140	929.0	0.0141	
		8 - 8 - 2	0.0145	964.0	0.0138	942.0	0.0141	

PERCENTAGE OF TIME TEMPERATURE IS ABOVE

	70.0	75.0	80.0	85.0	90.0	95.0
8 - 8 - 1	100.0	100.0	30.8	0.0	0.0	0.0
8 - 8 - 2	100.0	100.0	100.0	0.0	0.0	0.0

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	4.3	BTU/HR
STEADY-STATE HEAT SOURCES	99999.9	BTU/HR
ENVIRONMENTAL CONTROL SYSTEM	-102118.9	BTU/HR
HEAT SINK	-6063.2	BTU/HR
UNDERPLATFORM EXHAUST SYSTEM	0.0	BTU/HR

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(STATION) PLATFORM AREA BETWEEN STAIRWAYS FROM NODE 6 TO NODE 8

LENGTH 400.0 FT
AREA 700.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	9 - 9	280441.	935.0	-242229.	982.0	92334.	-46301.
AIR VELOCITY	(FPM)	9 - 9	401.	935.0	-346.	982.0	132.	-66.
AIR FLOW DIRECTION	(PERCENT)	9 - 9					67.0	33.0
DRY-BULB TEMPERATURE	(DEG F)	9 - 9 - 1	81.5	950.0	77.8	935.0	79.6	80.1
		9 - 9 - 2	81.1	904.0	78.3	940.0	79.9	79.6
		9 - 9 - 3	81.2	907.0	77.8	980.0	79.8	78.8
		9 - 9 - 4	82.1	909.0	76.9	978.0	79.8	78.0
HUMIDITY RATIO	(LB/LB)	9 - 9 - 1	0.0143	950.0	0.0137	924.0	0.0141	
		9 - 9 - 2	0.0142	967.0	0.0139	934.0	0.0141	
		9 - 9 - 3	0.0140	969.0	0.0139	907.0	0.0140	
		9 - 9 - 4	0.0140	967.0	0.0139	904.0	0.0139	

PERCENTAGE OF TIME TEMPERATURE IS ABOVE

	70.0	75.0	80.0	85.0	90.0	95.0
9 - 9 - 1	100.0	100.0	48.4	0.0	0.0	0.0
9 - 9 - 2	100.0	100.0	45.1	0.0	0.0	0.0
9 - 9 - 3	100.0	100.0	29.7	0.0	0.0	0.0
9 - 9 - 4	100.0	100.0	33.0	0.0	0.0	0.0

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	3415714.0	BTU/HR
STEADY-STATE HEAT SOURCES	275999.3	BTU/HR
ENVIRONMENTAL CONTROL SYSTEM	-3544811.0	BTU/HR
HEAT SINK	-22684.9	BTU/HR
UNDERPLATFORM EXHAUST SYSTEM	0.0	BTU/HR

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(STAIRWAY) STREET LEVEL STAIRWAY TO MEZZANINE FROM NODE 7 TO NODE 52

LENGTH 20.0 FT
AREA 96.5 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	10 -110	130795.	932.0	-106110.	949.0	27732.	-35082.
AIR VELOCITY	(FPM)	10 -110	1355.	932.0	-1100.	949.0	287.	-364.
AIR FLOW DIRECTION	(PERCENT)	10 -110					39.6	60.4
PERCENTAGE OF TIME OUTFLOW VELOCITY EXCEEDS 1000.0 FPM		10 -110					12.1	
DRY-BULB TEMPERATURE	(DEG F)	10 -110 - 1	81.9	915.0	80.1	978.0	80.5	81.6
HUMIDITY RATIO	(LB/LB)	10 -110 - 1	0.0165	921.0	0.0138	940.0	0.0154	

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(STATION) STREET EXIT TO EAST END OF MEZZANINE FROM NODE 7 TO NODE 8

LENGTH 200.0 FT
AREA 450.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	11 - 10	94587.	909.0	-109270.	969.0	21110.	-15780.
AIR VELOCITY	(FPM)	11 - 10	210.	909.0	-243.	969.0	47.	-35.
AIR FLOW DIRECTION	(PERCENT)	11 - 10					61.5	38.5
DRY-BULB TEMPERATURE	(DEG F)	11 - 10 - 1	80.6	922.0	80.0	905.0	80.3	80.3
		11 - 10 - 2	80.1	963.0	79.1	979.0	79.7	79.6
HUMIDITY RATIO	(LB/LB)	11 - 10 - 1	0.0145	922.0	0.0137	905.0	0.0141	
		11 - 10 - 2	0.0140	964.0	0.0139	910.0	0.0139	

PERCENTAGE OF TIME TEMPERATURE IS ABOVE

	70.0	75.0	80.0	85.0	90.0	95.0
11 - 10 - 1	100.0	100.0	89.0	0.0	0.0	0.0
11 - 10 - 2	100.0	100.0	24.2	0.0	0.0	0.0

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	5.0	BTU/HR
STEADY-STATE HEAT SOURCES	99999.9	BTU/HR
ENVIRONMENTAL CONTROL SYSTEM	-94258.9	BTU/HR
HEAT SINK	-5140.4	BTU/HR
UNDERPLATFORM EXHAUST SYSTEM	0.0	BTU/HR

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(STATION) EAST STAIRWAY TO END OF STATION FROM NODE 8 TO NODE 9

LENGTH 100.0 FT
AREA 700.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	12 - 11	271428.	939.0	-263316.	973.0	105658.	-54296.
AIR VELOCITY	(FPM)	12 - 11	388.	939.0	-376.	973.0	151.	-78.
AIR FLOW DIRECTION	(PERCENT)	12 - 11					64.8	35.2
DRY-BULB TEMPERATURE	(DEG F)	12 - 11 - 1	85.3	910.0	75.9	966.0	80.2	78.1
HUMIDITY RATIO	(LB/LB)	12 - 11 - 1	0.0140	911.0	0.0138	900.0	0.0139	

PERCENTAGE OF TIME TEMPERATURE IS ABOVE

	70.0	75.0	80.0	85.0	90.0	95.0
12 - 11 - 1	100.0	100.0	39.6	3.3	0.0	0.0

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	719308.1	BTU/HR
STEADY-STATE HEAT SOURCES	69999.6	BTU/HR
ENVIRONMENTAL CONTROL SYSTEM	-1054949.0	BTU/HR
HEAT SINK	-14444.3	BTU/HR
UNDERPLATFORM EXHAUST SYSTEM	0.0	BTU/HR

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(TUNNEL) STATION END TO EXHAUST FAN AT 3300FT FROM NODE 9 TO NODE 10

LENGTH 500.0 FT
AREA 400.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	13 - 12	271428.	939.0	-263316.	973.0	105658.	-54296.
AIR VELOCITY	(FPM)	13 - 12	679.	939.0	-658.	973.0	264.	-136.
AIR FLOW DIRECTION	(PERCENT)	13 - 12					64.8	35.2
DRY-BULB TEMPERATURE	(DEG F)	13 - 12 - 1	90.6	911.0	80.2	963.0	84.6	83.4
		13 - 12 - 2	91.7	914.0	83.7	964.0	87.5	86.3
		13 - 12 - 3	91.9	916.0	86.6	964.0	89.3	88.5
HUMIDITY RATIO	(LB/LB)	13 - 12 - 1	0.0142	912.0	0.0140	963.0	0.0140	
		13 - 12 - 2	0.0147	914.0	0.0141	963.0	0.0143	
		13 - 12 - 3	0.0154	915.0	0.0144	963.0	0.0148	

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	1068786.0	BTU/HR
STEADY-STATE HEAT SOURCES	51000.0	BTU/HR
HEAT SINK	-359598.6	BTU/HR

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(VENTILATION SHAFT) FAN SHAFT AT 3300 FT - EXHAUST MODE FROM NODE 10 TO NODE 53

LENGTH 78.7 FT
AREA 150.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	14 -114	153832.	968.0	119003.	914.0	137966.	0.
AIR VELOCITY	(FPM)	14 -114	1025.	968.0	793.	914.0	920.	0.
AIR FLOW DIRECTION	(PERCENT)	14 -114					100.0	0.0
PERCENTAGE OF TIME OUTFLOW VELOCITY EXCEEDS 1000.0 FPM		14 -114					94.5	
DRY-BULB TEMPERATURE	(DEG F)	14 -114 - 1	90.6	926.0	87.5	952.0	88.9	0.0
HUMIDITY RATIO	(LB/LB)	14 -114 - 1	0.0160	905.0	0.0146	950.0	0.0154	

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(TUNNEL) EXHAUST FAN TO 3700 FT FROM NODE 10 TO NODE 11

LENGTH 400.0 FT
AREA 400.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	15 - 13	133467.	918.0	-391841.	972.0	33636.	-120240.
AIR VELOCITY	(FPM)	15 - 13	334.	918.0	-980.	972.0	84.	-301.
AIR FLOW DIRECTION	(PERCENT)	15 - 13					42.9	57.1
DRY-BULB TEMPERATURE	(DEG F)	15 - 13 - 1	91.3	976.0	88.4	909.0	89.8	89.4
		15 - 13 - 2	90.2	973.0	86.6	910.0	88.0	88.0
HUMIDITY RATIO	(LB/LB)	15 - 13 - 1	0.0162	916.0	0.0157	950.0	0.0160	
		15 - 13 - 2	0.0164	922.0	0.0162	972.0	0.0163	

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	674234.6	BTU/HR
STEADY-STATE HEAT SOURCES	40800.0	BTU/HR
HEAT SINK	-330693.0	BTU/HR

SUMMARY OF SIMULATION FROM 900.00 TO 990.00 SECONDS

(TUNNEL) 3700 FT TO EAST PORTAL AT 4000 FT FROM NODE 10 TO NODE 11

LENGTH 300.0 FT
AREA 700.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	15 - 14	133467.	918.0	-391841.	972.0	33636.	-120240.
AIR VELOCITY	(FPM)	15 - 14	191.	918.0	-560.	972.0	48.	-172.
AIR FLOW DIRECTION	(PERCENT)	15 - 14					42.9	57.1
DRY-BULB TEMPERATURE	(DEG F)	15 - 14 - 1	87.6	971.0	84.9	910.0	85.8	86.1
		15 - 14 - 2	85.8	969.0	83.0	910.0	83.9	84.1
HUMIDITY RATIO	(LB/LB)	15 - 14 - 1	0.0165	923.0	0.0164	971.0	0.0164	
		15 - 14 - 2	0.0165	925.0	0.0165	970.0	0.0165	

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	470772.6	BTU/HR
STEADY-STATE HEAT SOURCES	30600.0	BTU/HR
HEAT SINK	-130576.6	BTU/HR

SES HEAT SINK ANALYSIS

ZONE NUMBER 1

SYSTEM PARTITIONING	OFF HOUR AVERAGE AIR TEMPERATURE (DEG F)	OFF HOUR AVERAGE HUMIDITY RATIO (LB/LB)
1 - 1 - 1	82.1	0.01648
1 - 2 - 1	82.1	0.01648
1 - 3 - 1	82.3	0.01648
1 - 3 - 2	82.6	0.01648
2 - 4 - 1	83.9	0.01582
2 - 4 - 2	83.7	0.01582
2 - 4 - 3	83.4	0.01581
5 - 5 - 1	82.7	0.01648
5 - 5 - 2	83.1	0.01648
5 - 5 - 3	83.6	0.01648
6 - 6 - 1	83.7	0.01544
6 - 6 - 2	83.2	0.01532
6 - 6 - 3	82.9	0.01538
3 -103 - 1	81.6	0.01648
4 -104 - 1	81.8	0.01631

SES HEAT SINK ANALYSIS

ZONE NUMBER 3

SYSTEM PARTITIONING	OFF HOUR AVERAGE AIR TEMPERATURE (DEG F)	OFF HOUR AVERAGE HUMIDITY RATIO (LB/LB)
10 -110 - 1	81.0	0.01529

SES HEAT SINK ANALYSIS

ZONE NUMBER 4

SYSTEM PARTITIONING	OFF HOUR AVERAGE AIR TEMPERATURE (DEG F)	OFF HOUR AVERAGE HUMIDITY RATIO (LB/LB)
13 - 12 - 1	84.5	0.01387
13 - 12 - 2	87.3	0.01420
13 - 12 - 3	89.1	0.01480
15 - 13 - 1	89.4	0.01600
15 - 13 - 2	87.9	0.01634
15 - 14 - 1	85.9	0.01644
15 - 14 - 2	84.0	0.01647
14 -114 - 1	88.9	0.01537

ENVIRONMENTAL CONTROL SYSTEM LOAD ESTIMATES

AVERAGED SUBSEGMENT HEAT GAINS(+) OR LOSSES(-), BTU/HR

THE DESIGN PERIOD IS NEITHER MORNING NOR EVENING RUSH HOUR

---------- ZONE NUMBER 2 ----- DESIGN CONDITION ----- 80.0 DEG F DRY BULB ----- 70.0 DEG F WET BULB ----------

SYSTEM PARTITIONING	TRAINS		STEADY-STATE		HEAT SINK	AIR FLOW		ENVIRONMENTAL CONTROL		TOTAL ENVIRONMENTAL CONTROL REQUIREMENT		
	SENSIBLE	LATENT	SENSIBLE	LATENT	SENSIBLE	SENSIBLE	LATENT	SENSIBLE	LATENT	SENSIBLE	LATENT	TOTAL
7 - 7 - 1	692955	10	70000	36000	-10706	453874	1076654	-1234363	-1097461	-1206123	-1112664	-2318787
8 - 8 - 1	2	0	50000	36000	-2599	-6206	23880	-40938	-51037	-41197	-59880	-101077
8 - 8 - 2	2	0	50000	36000	-2737	28788	197738	-61179	-200199	-76053	-233738	-309791
9 - 9 - 1	843498	0	69000	36000	-11762	19326	75759	-869718	-70744	-920062	-111759	-1031821
9 - 9 - 2	858009	0	69000	36000	-11672	-56925	-26015	-846361	-5702	-858412	-9985	-868397
9 - 9 - 3	861375	0	69000	36000	-11511	-58571	-31109	-877397	-15786	-860293	-4891	-865184
9 - 9 - 4	852831	0	68999	36000	-11623	16015	-12591	-951334	-21426	-926222	-23409	-949631
11 - 10 - 1	2	1	50000	36000	-2743	27534	195518	-64226	-205914	-74793	-231519	-306312
11 - 10 - 2	2	0	50000	36000	-2563	-25842	-1098	-30031	-33245	-21597	-34902	-56499
12 - 11 - 1	719308	0	69999	36000	-12209	331327	50506	-1054948	-68612	-1108425	-86506	-1194931
ZONE TOTAL	4827984	11	615998	360000	-80125	729320	1549242	-6030495	-1770126	-6093177	-1909253	-8002430

CONVECTIVE LOAD BREAKDOWN

AVERAGED ZONE CONVECTIVE HEAT GAINS(+) AND LOSSES(-), BTU/HR

SOURCE NO	NODE NO	SECTION NO	SEGMENT NO	SEGMENT NAME	SENSIBLE GAIN	LATENT GAIN	TOTAL
1	5				356447	1129576	1486023
2	7				33850	192558	226408
3	7				33084	185646	218730
4	9				305937	41460	347397

TIME 990.00 SECONDS 2 TRAIN(S) ARE OPERATIONAL

TRAIN NO.	RTE	TYP	LOCATION (FEET)	SPEED (MPH)	ACCELERATION (MPH/SEC)	AIR DRAG (LBS)	COEF. OF AIR DRAG	TRACTIVE EFFORT (LBS/MOTOR)	MOTOR CURRENT (AMPS)	HORSEPOWER TOTAL	HORSEPOWER AIR DRAG	GRID TEMPERATURE ACCEL. (DEG F)	GRID TEMPERATURE DECEL. (DEG F)	POWER LOSS (BTU/SEC-FT)	HEAT REJECTION (BTU/SEC-FT)
21	1	1	2877.21	19.25	2.82	330.	3.70	2395.	307.	3933.	17.	276.0	740.1	2.361	2.281
22	2	1	2744.71	11.00	-2.51	-64.	-2.19	0.	0.	0.	-2.	241.6	751.3	3.421	1.986

LENGTH (FT)	SYSTEM PARTITIONING		SENSIBLE HEAT LOAD (BTU/SEC)	LATENT HEAT LOAD (BTU/SEC)	AIR TEMPERATURE (DEG F)	HUMIDITY RATIO (LB/LB)	AIR FLOW (CFM)	AIR VELOCITY (FPM)	TRAIN POSITION RTE 1	RTE 2	RTE 3	RTE 4	RTE 5	RTE 6
100.0	1 - 1	(TUNNEL)			WEST PORTAL TO 1100 FT - ROUTE 1									
	1 - 1 - 1		0.2	0.0	82.10	0.01648	96768.6	322.6						
100.0	1 - 2	(TUNNEL)			1100 TO 1200 FT - ROUTE 1									
	1 - 2 - 1		0.2	0.0	82.12	0.01648	96768.6	387.1						
400.0	1 - 3	(TUNNEL)			1200 TO 1600 FT - ROUTE 1									
	1 - 3 - 1		0.4	0.0	82.28	0.01648	96768.6	430.1						
	1 - 3 - 2		0.4	0.0	82.64	0.01648								
600.0	2 - 4	(TUNNEL)			PORTAL TO 1600 FT - ROUTE 2									
	2 - 4 - 1		6.2	0.0	83.93	0.01582	-233181.7	-1036.4						
	2 - 4 - 2		6.2	0.0	83.73	0.01582								
	2 - 4 - 3		6.2	0.0	83.43	0.01581								
110.0	3 -103	(VENTILATION SHAFT)			VENT SHAFT AT 1600 FT - ROUTE 1									
	3 -103 - 1				81.65	0.01648	20498.8	102.5						
95.1	4 -104	(VENTILATION SHAFT)			VENT SHAFT AT 1600 FT - ROUTE 2									
	4 -104 - 1				81.78	0.01631	-49208.6	-370.8						
600.0	5 - 5	(TUNNEL)			1600 TO 2200 FT(START OF STA) -RTE 1									
	5 - 5 - 1		0.4	0.0	82.66	0.01648	76269.8	339.0						
	5 - 5 - 2		0.4	0.0	83.10	0.01648								
	5 - 5 - 3		0.4	0.0	83.64	0.01648								
600.0	6 - 6	(TUNNEL)			1600 TO 2200 FT(START OF STA)- RTE 2									
	6 - 6 - 1		5.9	0.0	83.67	0.01544	-183973.1	-817.7						
	6 - 6 - 2		5.9	0.0	83.22	0.01532								
	6 - 6 - 3		5.9	0.0	82.94	0.01530								

26

100.0	7 - 7	(STATION)			START OF STATION TO WEST STAIRWAY						
	7 - 7 - 1		-123.1	-299.1		80.00	0.01364	-107703.3	-153.9		22
200.0	8 - 8	(STATION)			WEST END OF MEZZANINE TO STREET EXIT						
	8 - 8 - 1		2.4	-6.6		80.00	0.01364	-35432.3	-78.7		
	8 - 8 - 2		-7.2	-54.9		80.00	0.01364				
400.0	9 - 9	(STATION)			PLATFORM AREA BETWEEN STAIRWAYS						
	9 - 9 - 1		-2.1	-21.0		80.00	0.01364	-72270.9	-103.2	21	22
	9 - 9 - 2		19.1	7.2		80.00	0.01364			21	22
	9 - 9 - 3		19.5	8.6		80.00	0.01364			21	22
	9 - 9 - 4		-1.2	3.5		80.00	0.01364			21	22
20.0	10 -110	(STAIRWAY)			STREET LEVEL STAIRWAY TO MEZZANINE						
	10 -110 - 1					81.04	0.01529	-30769.7	-318.9		
200.0	11 - 10	(STATION)			STREET EXIT TO EAST END OF MEZZANINE						
	11 - 10 - 1		-6.9	-54.3		80.00	0.01364	-4662.6	-10.4		
	11 - 10 - 2		7.9	0.3		80.00	0.01364				
100.0	12 - 11	(STATION)			EAST STAIRWAY TO END OF STATION						
	12 - 11 - 1		-88.6	-14.0		80.00	0.01364	-76933.6	-109.9	21	22
500.0	13 - 12	(TUNNEL)			STATION END TO EXHAUST FAN AT 3300FT						
	13 - 12 - 1		211.2	0.0		84.51	0.01387	-76933.6	-192.3	21	22
	13 - 12 - 2		4.7	0.0		87.27	0.01420				
	13 - 12 - 3		4.7	0.0		89.09	0.01480				
78.7	14 -114	(VENTILATION SHAFT)			FAN SHAFT AT 3300 FT - EXHAUST MODE						
	14 -114 - 1					88.87	0.01537	140738.2	938.0		
400.0	15 - 13	(TUNNEL)			EXHAUST FAN TO 3700 FT						
	15 - 13 - 1		5.8	0.0		89.42	0.01600	-217671.8	-544.2		
	15 - 13 - 2		5.8	0.0		87.87	0.01634				
300.0	15 - 14	(TUNNEL)			3700 FT TO EAST PORTAL AT 4000 FT						
	15 - 14 - 1		4.3	0.0		85.88	0.01644	-217671.8	-311.0		
	15 - 14 - 2		4.3	0.0		84.02	0.01647				

TIME 1170.00 SECONDS 2 TRAIN(S) ARE OPERATIONAL

TRAIN NO.	RTF	TYP	LOCATION (FEET)	SPEED (MPH)	ACCELERATION (MPH/SEC)	AIR DRAG (LBS)	COEF. OF AIR DRAG	TRACTIVE EFFORT (LBS/MOTOR)	MOTOR CURRENT (AMPS)	HORSEPOWER TOTAL	HORSEPOWER AIR DRAG	GRID TEMPERATURE ACCEL. (DEG F)	GRID TEMPERATURE DECEL. (DEG F)	POWER LOSS (BTU/SEC-FT)	HEAT REJECTION (BTU/SEC-FT)
25	1	1	2877.21	19.25	2.82	330.	3.70	2395.	307.	3933.	17.	276.0	740.1	2.361	2.281
26	2	1	2744.71	11.00	-2.51	-64.	-2.19	0.	0.	0.	-2.	241.6	751.3	3.421	1.986

LENGTH (FT)	SYSTEM PARTITIONING		SENSIBLE HEAT LOAD (BTU/SEC)	LATENT HEAT LOAD (BTU/SEC)	AIR TEMPERATURE (DEG F)	HUMIDITY RATIO (LB/LB)	AIR FLOW (CFM)	AIR VELOCITY (FPM)	TRAIN POSITION RTE 1	RTE 2	RTE 3	RTE 4	RTE 5	RTE 6
100.0	1 - 1	(TUNNEL)			WEST PORTAL TO 1100 FT - ROUTE 1									
	1 - 1 - 1		0.2	0.0	81.81	0.01648	96764.9	322.5						
100.0	1 - 2	(TUNNEL)			1100 TO 1200 FT - ROUTE 1									
	1 - 2 - 1		0.2	0.0	81.62	0.01648	96764.9	387.1						
400.0	1 - 3	(TUNNEL)			1200 TO 1600 FT - ROUTE 1									
	1 - 3 - 1		0.4	0.0	81.38	0.01648	96764.9	430.1						
	1 - 3 - 2		0.4	0.0	81.41	0.01648								
600.0	2 - 4	(TUNNEL)			PORTAL TO 1600 FT - ROUTE 2									
	2 - 4 - 1		6.2	0.0	84.46	0.01586	-233189.0	-1036.4						
	2 - 4 - 2		6.2	0.0	84.06	0.01586								
	2 - 4 - 3		6.2	0.0	83.64	0.01585								
110.0	3 -103	(VENTILATION SHAFT)			VENT SHAFT AT 1600 FT - ROUTE 1									
	3 -103 - 1				81.61	0.01648	20515.9	102.6						
95.1	4 -104	(VENTILATION SHAFT)			VENT SHAFT AT 1600 FT - ROUTE 2									
	4 -104 - 1				81.81	0.01647	-49197.8	-370.7						
600.0	5 - 5	(TUNNEL)			1600 TO 2200 FT(START OF STA) -RTE 1									
	5 - 5 - 1		0.4	0.0	81.67	0.01648	76248.9	338.9						
	5 - 5 - 2		0.4	0.0	81.98	0.01648								
	5 - 5 - 3		0.4	0.0	82.54	0.01648								
600.0	6 - 6	(TUNNEL)			1600 TO 2200 FT(START OF STA)- RTE 2									
	6 - 6 - 1		5.9	0.0	83.29	0.01559	-103991.1	-817.7						
	6 - 6 - 2		5.9	0.0	82.09	0.01519								
	6 - 6 - 3		5.9	0.0	80.82	0.01463								

TIME 1170.00 SECONDS 2 TRAIN(S) ARE OPERATIONAL

TRAIN NO.	RT F	TY P	LOCATION (FEET)	SPEED (MPH)	ACCELERATION (MPH/SEC)	AIR DRAG (LBS)	COEF. OF AIR DRAG	TRACTIVE EFFORT (LBS/MOTOR)	MOTOR CURRENT (AMPS)	HORSEPOWER TOTAL	HORSEPOWER AIR DRAG	GRID TEMPERATURE ACCEL. (DEG F)	GRID TEMPERATURE DECEL. (DEG F)	POWER LOSS (BTU/SEC-FT)	HEAT REJECTION (BTU/SEC-FT)
25	1	1	2877.21	19.25	2.82	330.	3.70	2395.	307.	3933.	17.	276.0	740.1	2.361	2.281
26	2	1	2744.71	11.00	-2.51	-64.	-2.19	0.	0.	0.	-2.	241.6	751.3	3.421	1.986

LENGTH (FT)	SYSTEM PARTITIONING		SENSIBLE HEAT LOAD (BTU/SEC)	LATENT HEAT LOAD (BTU/SEC)	AIR TEMPERATURE (DEG F)	HUMIDITY RATIO (LB/LB)	AIR FLOW (CFM)	AIR VELOCITY (FPM)	TRAIN POSITION RTE 1	RTE 2	RTE 3	RTE 4	RTE 5	RTE 6
100.0	1 - 1	(TUNNEL)			WEST PORTAL TO 1100 FT - ROUTE 1									
	1 - 1 - 1		0.2	0.0	81.81	0.01648	96764.9	322.5						
100.0	1 - 2	(TUNNEL)			1100 TO 1200 FT - ROUTE 1									
	1 - 2 - 1		0.2	0.0	81.62	0.01648	96764.9	387.1						
400.0	1 - 3	(TUNNEL)			1200 TO 1600 FT - ROUTE 1									
	1 - 3 - 1		0.4	0.0	81.38	0.01648	96764.9	430.1						
	1 - 3 - 2		0.4	0.0	81.41	0.01648								
600.0	2 - 4	(TUNNEL)			PORTAL TO 1600 FT - ROUTE 2									
	2 - 4 - 1		6.2	0.0	84.46	0.01586	-233189.0	-1036.4						
	2 - 4 - 2		6.2	0.0	84.06	0.01586								
	2 - 4 - 3		6.2	0.0	83.64	0.01585								
110.0	3 -103	(VENTILATION SHAFT)			VENT SHAFT AT 1600 FT - ROUTE 1									
	3 -103 - 1				81.61	0.01648	20515.9	102.6						
95.1	4 -104	(VENTILATION SHAFT)			VENT SHAFT AT 1600 FT - ROUTE 2									
	4 -104 - 1				81.81	0.01647	-49197.8	-370.7						
600.0	5 - 5	(TUNNEL)			1600 TO 2200 FT(START OF STA) -RTE 1									
	5 - 5 - 1		0.4	0.0	81.67	0.01648	76248.9	338.9						
	5 - 5 - 2		0.4	0.0	81.98	0.01648								
	5 - 5 - 3		0.4	0.0	82.54	0.01648								
600.0	6 - 6	(TUNNEL)			1600 TO 2200 FT(START OF STA)- RTE 2									
	6 - 6 - 1		5.9	0.0	83.29	0.01559	-103991.1	-817.7						
	6 - 6 - 2		5.9	0.0	82.09	0.01519								
	6 - 6 - 3		5.9	0.0	80.82	0.01463								

28

100.0	7 - 7	(STATION)			START OF STATION TO WEST STAIRWAY					
	7 - 7 - 1		-226.8	-299.1	78.06	0.01308	-107742.2	-153.9		26
200.0	8 - 8	(STATION)			WEST END OF MEZZANINE TO STREET EXIT					
	8 - 8 - 1		2.4	-6.6	79.80	0.01387	-35465.9	-78.8		
	8 - 8 - 2		-7.2	-54.9	80.00	0.01381				
400.0	9 - 9	(STATION)			PLATFORM AREA BETWEEN STAIRWAYS					
	9 - 9 - 1		151.0	-21.0	79.87	0.01396	-72276.3	-103.3	25	26
	9 - 9 - 2		207.4	7.2	80.19	0.01398			25	26
	9 - 9 - 3		206.9	8.6	79.95	0.01390			25	26
	9 - 9 - 4		188.6	3.5	79.47	0.01382			25	26
20.0	10 -110	(STAIRWAY)			STREET LEVEL STAIRWAY TO MEZZANINE					
	10 -110 - 1				80.98	0.01529	-30833.9	-319.5		
200.0	11 - 10	(STATION)			STREET EXIT TO EAST END OF MEZZANINE					
	11 - 10 - 1		-6.9	-54.3	79.74	0.01350	-4632.0	-10.3		
	11 - 10 - 2		7.9	0.3	79.27	0.01376				
100.0	12 - 11	(STATION)			EAST STAIRWAY TO END OF STATION					
	12 - 11 - 1		138.3	-14.0	79.72	0.01375	-76908.3	-109.9	25	26
500.0	13 - 12	(TUNNEL)			STATION END TO EXHAUST FAN AT 3300FT					
	13 - 12 - 1		211.2	0.0	86.07	0.01392	-76908.3	-192.3	25	26
	13 - 12 - 2		4.7	0.0	87.97	0.01428				
	13 - 12 - 3		4.7	0.0	89.40	0.01504				
78.7	14 -114	(VENTILATION SHAFT)			FAN SHAFT AT 3300 FT - EXHAUST MODE					
	14 -114 - 1				89.13	0.01594	140738.6	938.0		
400.0	15 - 13	(TUNNEL)			EXHAUST FAN TO 3700 FT					
	15 - 13 - 1		5.8	0.0	89.00	0.01610	-217646.9	-544.1		
	15 - 13 - 2		5.8	0.0	87.10	0.01635				
300.0	15 - 14	(TUNNEL)			3700 FT TO EAST PORTAL AT 4000 FT					
	15 - 14 - 1		4.3	0.0	85.25	0.01644	-217646.9	-310.9		
	15 - 14 - 2		4.3	0.0	83.21	0.01647				

TIME 1260.00 SECONDS 2 TRAIN(S) ARE OPERATIONAL

TRAIN NO.	RTF	TYP	LOCATION (FEET)	SPEED (MPH)	ACCELERATION (MPH/SEC)	AIR DRAG (LBS)	COEF. OF AIR DRAG	TRACTIVE EFFORT (LBS/MOTOR)	MOTOR CURRENT (AMPS)	HORSEPOWER TOTAL	HORSEPOWER AIR DRAG	GRID TEMPERATURE ACCEL. (DEG F)	GRID TEMPERATURE DECEL. (DEG F)	POWER LOSS (BTU/SEC-FT)	HEAT REJECTION (BTU/SEC-FT)
27	1	1	2877.21	19.25	2.82	330.	3.70	2395.	307.	3933.	17.	276.0	740.1	2.361	2.281
28	2	1	2744.71	11.00	-2.51	-64.	-2.19	0.	0.	0.	-2.	241.6	751.3	3.421	1.986

LENGTH (FT)	SYSTEM PARTITIONING		SENSIBLE HEAT LOAD (BTU/SEC)	LATENT HEAT LOAD (BTU/SEC)	AIR TEMPERATURE (DEG F)	HUMIDITY RATIO (LB/LB)	AIR FLOW (CFM)	AIR VELOCITY (FPM)	TRAIN POSITION RTE 1	RTE 2	RTE 3	RTE 4	RTE 5	RTE 6
100.0	1 - 1	(TUNNEL)			WEST PORTAL TO 1100 FT - ROUTE 1									
	1 - 1 - 1		0.2	0.0	81.81	0.01648	96761.2	322.5						
100.0	1 - 2	(TUNNEL)			1100 TO 1200 FT - ROUTE 1									
	1 - 2 - 1		0.2	0.0	81.62	0.01648	96761.2	387.0						
400.0	1 - 3	(TUNNEL)			1200 TO 1600 FT - ROUTE 1									
	1 - 3 - 1		0.4	0.0	81.38	0.01648	96761.2	430.0						
	1 - 3 - 2		0.4	0.0	81.41	0.01648								
600.0	2 - 4	(TUNNEL)			PORTAL TO 1600 FT - ROUTE 2									
	2 - 4 - 1		6.2	0.0	84.39	0.01583	-233191.6	-1036.4						
	2 - 4 - 2		6.2	0.0	84.01	0.01584								
	2 - 4 - 3		6.2	0.0	83.59	0.01583								
110.0	3 -103	(VENTILATION SHAFT)			VENT SHAFT AT 1600 FT - ROUTE 1									
	3 -103 - 1				81.61	0.01648	20518.2	102.6						
95.1	4 -104	(VENTILATION SHAFT)			VENT SHAFT AT 1600 FT - ROUTE 2									
	4 -104 - 1				81.81	0.01647	-49200.8	-370.7						
600.0	5 - 5	(TUNNEL)			1600 TO 2200 FT(START OF STA) -RTE 1									
	5 - 5 - 1		0.4	0.0	81.67	0.01648	76243.0	338.9						
	5 - 5 - 2		0.4	0.0	81.97	0.01648								
	5 - 5 - 3		0.4	0.0	82.54	0.01648								
600.0	6 - 6	(TUNNEL)			1600 TO 2200 FT(START OF STA)- RTE 2									
	6 - 6 - 1		5.9	0.0	83.24	0.01558	-183990.8	-817.7						
	6 - 6 - 2		5.9	0.0	82.04	0.01518								
	6 - 6 - 3		5.9	0.0	80.75	0.01463								

30

100.0	7 - 7	(STATION)			START OF STATION TO WEST STAIRWAY					
	7 - 7 - 1		-226.8	-299.1	77.93	0.01308	-107747.9	-153.9		28
200.0	8 - 8	(STATION)			WEST END OF MEZZANINE TO STREET EXIT					
	8 - 8 - 1		2.4	-6.6	79.65	0.01390	-35473.9	-78.8		
	8 - 8 - 2		-7.2	-54.9	79.93	0.01385				
400.0	9 - 9	(STATION)			PLATFORM AREA BETWEEN STAIRWAYS					
	9 - 9 - 1		151.1	-21.0	79.70	0.01397	-72273.9	-103.2	27	28
	9 - 9 - 2		207.5	7.2	80.02	0.01399			27	28
	9 - 9 - 3		206.9	8.6	79.80	0.01392			27	28
	9 - 9 - 4		188.6	3.5	79.37	0.01386			27	28
20.0	10 -110	(STAIRWAY)			STREET LEVEL STAIRWAY TO MEZZANINE					
	10 -110 - 1				80.95	0.01530	-30848.8	-319.7		
200.0	11 - 10	(STATION)			STREET EXIT TO EAST END OF MEZZANINE					
	11 - 10 - 1		-6.9	-54.3	79.66	0.01351	-4625.1	-10.3		
	11 - 10 - 2		7.9	0.3	79.19	0.01379				
100.0	12 - 11	(STATION)			EAST STAIRWAY TO END OF STATION					
	12 - 11 - 1		138.3	-14.0	79.68	0.01380	-76898.9	-109.9	27	28
500.0	13 - 12	(TUNNEL)			STATION END TO EXHAUST FAN AT 3300FT					
	13 - 12 - 1		211.2	0.0	86.07	0.01399	-76898.9	-192.2	27	28
	13 - 12 - 2		4.7	0.0	87.98	0.01434				
	13 - 12 - 3		4.7	0.0	89.37	0.01509				
78.7	14 -114	(VENTILATION SHAFT)			FAN SHAFT AT 3300 FT - EXHAUST MODE					
	14 -114 - 1				89.03	0.01595	140737.4	938.0		
400.0	15 - 13	(TUNNEL)			EXHAUST FAN TO 3700 FT					
	15 - 13 - 1		5.8	0.0	88.90	0.01612	-217636.3	-544.1		
	15 - 13 - 2		5.8	0.0	87.00	0.01636				
300.0	15 - 14	(TUNNEL)			3700 FT TO EAST PORTAL AT 4000 FT					
	15 - 14 - 1		4.3	0.0	85.18	0.01644	-217636.3	-310.9		
	15 - 14 - 2		4.3	0.0	83.19	0.01647				

SUMMARY OF SIMULATION FROM 1170.00 TO 1260.00 SECONDS

(TUNNEL) WEST PORTAL TO 1100 FT - ROUTE 1 FROM NODE 1 TO NODE 3

LENGTH 100.0 FT
AREA 300.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	1 - 1	587505.	1200.0	95715.	1176.0	200862.	0.
AIR VELOCITY	(FPM)	1 - 1	1958.	1200.0	319.	1176.0	670.	0.
AIR FLOW DIRECTION	(PERCENT)	1 - 1					100.0	0.0
DRY-BULB TEMPERATURE	(DEG F)	1 - 1 - 1	85.7	1200.0	81.8	1192.0	82.1	0.0
HUMIDITY RATIO	(LB/LB)	1 - 1 - 1	0.0165	1170.0	0.0165	1170.0	0.0165	

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	76090.6	BTU/HR
STEADY-STATE HEAT SOURCES	700.0	BTU/HR
HEAT SINK	-43538.2	BTU/HR

SUMMARY OF SIMULATION FROM 1170.00 TO 1260.00 SECONDS

(TUNNEL) 1100 TO 1200 FT - ROUTE 1 FROM NODE 1 TO NODE 3

LENGTH 100.0 FT
AREA 250.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	1 - 2	587505.	1200.0	95715.	1176.0	200862.	0.
AIR VELOCITY	(FPM)	1 - 2	2350.	1200.0	383.	1176.0	803.	0.
AIR FLOW DIRECTION	(PERCENT)	1 - 2					100.0	0.0
DRY-BULB TEMPERATURE	(DEG F)	1 - 2 - 1	86.8	1200.0	81.6	1193.0	82.1	0.0
HUMIDITY RATIO	(LB/LB)	1 - 2 - 1	0.0165	1170.0	0.0165	1170.0	0.0165	

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	73981.3	BTU/HR
STEADY-STATE HEAT SOURCES	700.0	BTU/HR
HEAT SINK	-47824.6	BTU/HR

SUMMARY OF SIMULATION FROM 1170.00 TO 1260.00 SECONDS

(TUNNEL) 1200 TO 1600 FT - ROUTE 1 FROM NODE 1 TO NODE 3

LENGTH 400.0 FT
AREA 225.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	1 - 3	587505.	1200.0	95715.	1176.0	200862.	0.
AIR VELOCITY	(FPM)	1 - 3	2611.	1200.0	425.	1176.0	893.	0.
AIR FLOW DIRECTION	(PERCENT)	1 - 3					100.0	0.0
DRY-BULB TEMPERATURE	(DEG F)	1 - 3 - 1	88.0	1202.0	81.3	1194.0	82.4	0.0
		1 - 3 - 2	87.9	1205.0	81.1	1196.0	82.7	0.0
HUMIDITY RATIO	(LB/LB)	1 - 3 - 1	0.0165	1170.0	0.0165	1170.0	0.0165	
		1 - 3 - 2	0.0165	1170.0	0.0165	1206.0	0.0165	

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	298992.0	BTU/HR
STEADY-STATE HEAT SOURCES	2800.0	BTU/HR
HEAT SINK	-216770.1	BTU/HR

SUMMARY OF SIMULATION FROM 1170.00 TO 1260.00 SECONDS

(TUNNEL) PORTAL TO 1600 FT - ROUTE 2 FROM NODE 2 TO NODE 4

LENGTH 600.0 FT
AREA 225.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	2 - 4	-82105.	1190.0	-582129.	1230.0	0.	-223628.
AIR VELOCITY	(FPM)	2 - 4	-365.	1198.0	-2587.	1230.0	0.	-994.
AIR FLOW DIRECTION	(PERCENT)	2 - 4					0.0	100.0
DRY-BULB TEMPERATURE	(DEG F)	2 - 4 - 1	88.7	1234.0	81.9	1226.0	0.0	84.1
		2 - 4 - 2	89.4	1232.0	81.8	1224.0	0.0	83.9
		2 - 4 - 3	88.8	1230.0	81.7	1221.0	0.0	83.5
HUMIDITY RATIO	(LB/LB)	2 - 4 - 1	0.0159	1236.0	0.0158	1231.0	0.0158	
		2 - 4 - 2	0.0159	1206.0	0.0157	1231.0	0.0158	
		2 - 4 - 3	0.0161	1198.0	0.0156	1222.0	0.0158	

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	501011.4	BTU/HR
STEADY-STATE HEAT SOURCES	61199.9	BTU/HR
HEAT SINK	-484632.6	BTU/HR

SUMMARY OF SIMULATION FROM 1170.00 TO 1260.00 SECONDS

(VENTILATION SHAFT) VENT SHAFT AT 1600 FT - ROUTE 1 FROM NODE 3 TO NODE 50

LENGTH 110.0 FT
AREA 200.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	3 -103	293918.	1199.0	-128149.	1207.0	25310.	-44189.
AIR VELOCITY	(FPM)	3 -103	1470.	1199.0	-641.	1207.0	127.	-221.
AIR FLOW DIRECTION	(PERCENT)	3 -103					37.4	62.6
PERCENTAGE OF TIME OUTFLOW VELOCITY EXCEEDS 1000.0 FPM		3 -103					6.6	
DRY-BULB TEMPERATURE	(DEG F)	3 -103 - 1	81.8	1238.0	81.4	1201.0	81.6	81.7
HUMIDITY RATIO	(LB/LB)	3 -103 - 1	0.0165	1235.0	0.0165	1201.0	0.0165	

SUMMARY OF SIMULATION FROM 1170.00 TO 1260.00 SECONDS

(VENTILATION SHAFT) VENT SHAFT AT 1600 FT - ROUTE 2 FROM NODE 4 TO NODE 51

LENGTH 95.1 FT
AREA 132.7 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	4 -104	136777.	1221.0	-295976.	1230.0	13683.	-61570.
AIR VELOCITY	(FPM)	4 -104	1031.	1221.0	-2230.	1230.0	103.	-464.
AIR FLOW DIRECTION	(PERCENT)	4 -104					25.3	74.7
PERCENTAGE OF TIME OUTFLOW VELOCITY EXCEEDS 1000.0 FPM		4 -104					9.9	
DRY-BULB TEMPERATURE	(DEG F)	4 -104 - 1	81.8	1234.0	81.6	1220.0	81.7	81.8
HUMIDITY RATIO	(LB/LB)	4 -104 - 1	0.0165	1201.0	0.0155	1222.0	0.0163	

SUMMARY OF SIMULATION FROM 1170.00 TO 1260.00 SECONDS

(TUNNEL) 1600 TO 2200 FT(START OF STA) -RTE 1 FROM NODE 3 TO NODE 5

LENGTH 600.0 FT
AREA 225.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	5 - 5	500070.	1205.0	62976.	1253.0	219742.	0.
AIR VELOCITY	(FPM)	5 - 5	2223.	1205.0	280.	1253.0	977.	0.
AIR FLOW DIRECTION	(PERCENT)	5 - 5					100.0	0.0
DRY-BULB TEMPERATURE	(DEG F)	5 - 5 - 1	87.6	1207.0	81.1	1199.0	82.7	0.0
		5 - 5 - 2	89.0	1210.0	81.0	1201.0	83.1	0.0
		5 - 5 - 3	90.4	1214.0	81.0	1203.0	83.7	0.0
HUMIDITY RATIO	(LB/LB)	5 - 5 - 1	0.0165	1233.0	0.0165	1170.0	0.0165	
		5 - 5 - 2	0.0165	1219.0	0.0165	1170.0	0.0165	
		5 - 5 - 3	0.0165	1227.0	0.0165	1170.0	0.0165	

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	561493.2	BTU/HR
STEADY-STATE HEAT SOURCES	4200.0	BTU/HR
HEAT SINK	-418780.1	BTU/HR

SUMMARY OF SIMULATION FROM 1170.00 TO 1260.00 SECONDS

(TUNNEL) 1600 TO 2200 FT(START OF STA)- RTE 2 FROM NODE 4 TO NODE 5

LENGTH 600.0 FT
AREA 225.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	6 - 6	-413.	1190.0	-347432.	1222.0	0.	-175741.
AIR VELOCITY	(FPM)	6 - 6	-2.	1190.0	-1544.	1222.0	0.	-781.
AIR FLOW DIRECTION	(PERCENT)	6 - 6					0.0	100.0
DRY-BULB TEMPERATURE	(DEG F)	6 - 6 - 1	88.2	1228.0	81.5	1217.0	0.0	83.7
		6 - 6 - 2	89.4	1226.0	81.2	1211.0	0.0	83.3
		6 - 6 - 3	90.0	1222.0	80.6	1174.0	0.0	82.9
HUMIDITY RATIO	(LB/LB)	6 - 6 - 1	0.0158	1247.0	0.0152	1213.0	0.0155	
		6 - 6 - 2	0.0160	1241.0	0.0150	1180.0	0.0153	
		6 - 6 - 3	0.0162	1237.0	0.0146	1171.0	0.0154	

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	622783.9	BTU/HR
STEADY-STATE HEAT SOURCES	61199.9	BTU/HR
HEAT SINK	-420483.6	BTU/HR

SUMMARY OF SIMULATION FROM 1170.00 TO 1260.00 SECONDS

(STATION) START OF STATION TO WEST STAIRWAY FROM NODE 5 TO NODE 6

LENGTH 100.0 FT
AREA 700.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	7 - 7	362801.	1204.0	-185603.	1247.0	89413.	-45412.
AIR VELOCITY	(FPM)	7 - 7	518.	1204.0	-265.	1247.0	128.	-65.
AIR FLOW DIRECTION	(PERCENT)	7 - 7					49.5	50.5
DRY-BULB TEMPERATURE	(DEG F)	7 - 7 - 1	84.6	1222.0	76.6	1183.0	78.6	80.5
HUMIDITY RATIO	(LB/LB)	7 - 7 - 1	0.0149	1222.0	0.0126	1180.0	0.0138	

PERCENTAGE OF TIME TEMPERATURE IS ABOVE

	70.0	75.0	80.0	85.0	90.0	95.0
7 - 7 - 1	100.0	100.0	38.5	0.0	0.0	0.0

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	693016.5	BTU/HR
STEADY-STATE HEAT SOURCES	69999.6	BTU/HR
ENVIRONMENTAL CONTROL SYSTEM	-1206122.0	BTU/HR
HEAT SINK	-4514.4	BTU/HR
UNDERPLATFORM EXHAUST SYSTEM	0.0	BTU/HR

SUMMARY OF SIMULATION FROM 1170.00 TO 1260.00 SECONDS

(STATION) WEST END OF MEZZANINE TO STREET EXIT FROM NODE 6 TO NODE 7

LENGTH 200.0 FT
AREA 450.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	8 - 8	97618.	1202.0	-101540.	1219.0	17397.	-19428.
AIR VELOCITY	(FPM)	8 - 8	217.	1202.0	-226.	1219.0	39.	-43.
AIR FLOW DIRECTION	(PERCENT)	8 - 8					56.0	44.0
DRY-BULB TEMPERATURE	(DEG F)	8 - 8 - 1	79.8	1193.0	79.4	1210.0	79.7	79.6
		8 - 8 - 2	80.3	1234.0	79.7	1212.0	80.0	80.0
HUMIDITY RATIO	(LB/LB)	8 - 8 - 1	0.0140	1210.0	0.0138	1198.0	0.0139	
		8 - 8 - 2	0.0143	1233.0	0.0135	1212.0	0.0139	

PERCENTAGE OF TIME TEMPERATURE IS ABOVE

	70.0	75.0	80.0	85.0	90.0	95.0
8 - 8 - 1	100.0	100.0	0.0	0.0	0.0	0.0
8 - 8 - 2	100.0	100.0	56.0	0.0	0.0	0.0

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	4.5	BTU/HR
STEADY-STATE HEAT SOURCES	99999.9	BTU/HR
ENVIRONMENTAL CONTROL SYSTEM	-117249.9	BTU/HR
HEAT SINK	-4136.0	BTU/HR
UNDERPLATFORM EXHAUST SYSTEM	0.0	BTU/HR

SUMMARY OF SIMULATION FROM 1170.00 TO 1260.00 SECONDS

(STATION) PLATFORM AREA BETWEEN STAIRWAYS FROM NODE 6 TO NODE 8

LENGTH 400.0 FT
AREA 700.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	9 - 9	280438.	1205.0	-242232.	1252.0	92333.	-46301.
AIR VELOCITY	(FPM)	9 - 9	401.	1205.0	-346.	1252.0	132.	-66.
AIR FLOW DIRECTION	(PERCENT)	9 - 9					67.0	33.0
DRY-BULB TEMPERATURE	(DEG F)	9 - 9 - 1	81.3	1220.0	77.5	1204.0	79.2	79.7
		9 - 9 - 2	80.9	1174.0	78.0	1210.0	79.6	79.4
		9 - 9 - 3	81.2	1177.0	77.7	1250.0	79.8	78.8
		9 - 9 - 4	82.0	1179.0	76.9	1248.0	79.8	78.0
HUMIDITY RATIO	(LB/LB)	9 - 9 - 1	0.0142	1220.0	0.0135	1194.0	0.0139	
		9 - 9 - 2	0.0140	1238.0	0.0137	1204.0	0.0139	
		9 - 9 - 3	0.0139	1258.0	0.0138	1209.0	0.0139	
		9 - 9 - 4	0.0139	1236.0	0.0138	1175.0	0.0139	

PERCENTAGE OF TIME TEMPERATURE IS ABOVE

	70.0	75.0	80.0	85.0	90.0	95.0
9 - 9 - 1	100.0	100.0	31.9	0.0	0.0	0.0
9 - 9 - 2	100.0	100.0	28.6	0.0	0.0	0.0
9 - 9 - 3	100.0	100.0	28.6	0.0	0.0	0.0
9 - 9 - 4	100.0	100.0	33.0	0.0	0.0	0.0

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	3416093.0	BTU/HR
STEADY-STATE HEAT SOURCES	275998.3	BTU/HR
ENVIRONMENTAL CONTROL SYSTEM	-3564987.0	BTU/HR
HEAT SINK	-14298.7	BTU/HR
UNDERPLATFORM EXHAUST SYSTEM	0.0	BTU/HR

SUMMARY OF SIMULATION FROM 1170.00 TO 1260.00 SECONDS

(STAIRWAY) STREET LEVEL STAIRWAY TO MEZZANINE FROM NODE 7 TO NODE 52

LENGTH 20.0 FT
AREA 96.5 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	10 -110	130770.	1202.0	-106115.	1219.0	27721.	-35095.
AIR VELOCITY	(FPM)	10 -110	1355.	1202.0	-1100.	1219.0	287.	-364.
AIR FLOW DIRECTION	(PERCENT)	10 -110					39.6	60.4
PERCENTAGE OF TIME OUTFLOW VELOCITY EXCEEDS 1000.0 FPM		10 -110					12.1	
DRY-BULB TEMPERATURE	(DEG F)	10 -110 - 1	81.9	1185.0	79.6	1210.0	80.1	81.5
HUMIDITY RATIO	(LB/LB)	10 -110 - 1	0.0165	1192.0	0.0136	1210.0	0.0153	

SUMMARY OF SIMULATION FROM 1170.00 TO 1260.00 SECONDS

(STATION) STREET EXIT TO EAST END OF MEZZANINE FROM NODE 7 TO NODE 8

LENGTH 200.0 FT
AREA 450.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	11 - 10	94592.	1179.0	-109265.	1239.0	21119.	-15776.
AIR VELOCITY	(FPM)	11 - 10	210.	1179.0	-243.	1239.0	47.	-35.
AIR FLOW DIRECTION	(PERCENT)	11 - 10					61.5	38.5
DRY-BULB TEMPERATURE	(DEG F)	11 - 10 - 1	80.3	1192.0	79.7	1260.0	80.0	80.0
		11 - 10 - 2	80.2	1234.0	79.0	1249.0	79.7	79.6
HUMIDITY RATIO	(LB/LB)	11 - 10 - 1	0.0143	1192.0	0.0134	1175.0	0.0138	
		11 - 10 - 2	0.0138	1234.0	0.0137	1181.0	0.0138	

PERCENTAGE OF TIME TEMPERATURE IS ABOVE

	70.0	75.0	80.0	85.0	90.0	95.0
11 - 10 - 1	100.0	100.0	60.4	0.0	0.0	0.0
11 - 10 - 2	100.0	100.0	23.1	0.0	0.0	0.0

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	5.1	BTU/HR
STEADY-STATE HEAT SOURCES	99999.9	BTU/HR
ENVIRONMENTAL CONTROL SYSTEM	-96389.9	BTU/HR
HEAT SINK	-4156.4	BTU/HR
UNDERPLATFORM EXHAUST SYSTEM	0.0	BTU/HR

SUMMARY OF SIMULATION FROM 1170.00 TO 1260.00 SECONDS

(STATION) EAST STAIRWAY TO END OF STATION FROM NODE 8 TO NODE 9

LENGTH 100.0 FT
AREA 700.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	12 - 11	271456.	1209.0	-263306.	1243.0	105665.	-54290.
AIR VELOCITY	(FPM)	12 - 11	388.	1209.0	-376.	1243.0	151.	-78.
AIR FLOW DIRECTION	(PERCENT)	12 - 11					64.8	35.2
DRY-BULB TEMPERATURE	(DEG F)	12 - 11 - 1	84.9	1180.0	75.5	1236.0	79.9	77.7
HUMIDITY RATIO	(LB/LB)	12 - 11 - 1	0.0139	1181.0	0.0137	1170.0	0.0138	

PERCENTAGE OF TIME TEMPERATURE IS ABOVE

	70.0	75.0	80.0	85.0	90.0	95.0
12 - 11 - 1	100.0	100.0	35.2	0.0	0.0	0.0

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	719403.1	BTU/HR
STEADY-STATE HEAT SOURCES	69998.7	BTU/HR
ENVIRONMENTAL CONTROL SYSTEM	-1108424.0	BTU/HR
HEAT SINK	-9829.4	BTU/HR
UNDERPLATFORM EXHAUST SYSTEM	0.0	BTU/HR

SUMMARY OF SIMULATION FROM 1170.00 TO 1260.00 SECONDS

(TUNNEL) STATION END TO EXHAUST FAN AT 3300FT FROM NODE 9 TO NODE 10

LENGTH 500.0 FT
AREA 400.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	13 - 12	271456.	1209.0	-263306.	1243.0	105665.	-54290.
AIR VELOCITY	(FPM)	13 - 12	679.	1209.0	-658.	1243.0	264.	-136.
AIR FLOW DIRECTION	(PERCENT)	13 - 12					64.8	35.2
DRY-BULB TEMPERATURE	(DEG F)	13 - 12 - 1	90.5	1181.0	80.0	1233.0	84.4	83.2
		13 - 12 - 2	91.6	1184.0	83.5	1234.0	87.3	86.1
		13 - 12 - 3	91.8	1186.0	86.4	1234.0	89.1	88.4
HUMIDITY RATIO	(LB/LB)	13 - 12 - 1	0.0142	1182.0	0.0139	1233.0	0.0140	
		13 - 12 - 2	0.0147	1184.0	0.0140	1233.0	0.0142	
		13 - 12 - 3	0.0154	1185.0	0.0143	1233.0	0.0148	

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	1068952.0	BTU/HR
STEADY-STATE HEAT SOURCES	51000.0	BTU/HR
HEAT SINK	-350839.4	BTU/HR

SUMMARY OF SIMULATION FROM 1170.00 TO 1260.00 SECONDS

(VENTILATION SHAFT) FAN SHAFT AT 3300 FT - EXHAUST MODE FROM NODE 10 TO NODE 53

LENGTH 78.7 FT
AREA 150.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	14 -114	153831.	1238.0	119003.	1184.0	137966.	0.
AIR VELOCITY	(FPM)	14 -114	1025.	1238.0	793.	1184.0	920.	0.
AIR FLOW DIRECTION	(PERCENT)	14 -114					100.0	0.0
PERCENTAGE OF TIME OUTFLOW VELOCITY EXCEEDS 1000.0 FPM		14 -114					94.5	
DRY-BULB TEMPERATURE	(DEG F)	14 -114 - 1	90.5	1196.0	87.4	1222.0	88.8	0.0
HUMIDITY RATIO	(LB/LB)	14 -114 - 1	0.0160	1174.0	0.0145	1220.0	0.0153	

SUMMARY OF SIMULATION FROM 1170.00 TO 1260.00 SECONDS

(TUNNEL) EXHAUST FAN TO 3700 FT FROM NODE 10 TO NODE 11

LENGTH 400.0 FT
AREA 400.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	15 - 13	133468.	1188.0	-391831.	1242.0	33641.	-120232.
AIR VELOCITY	(FPM)	15 - 13	334.	1188.0	-980.	1242.0	84.	-301.
AIR FLOW DIRECTION	(PERCENT)	15 - 13					42.9	57.1
DRY-BULB TEMPERATURE	(DEG F)	15 - 13 - 1	91.2	1246.0	88.4	1179.0	89.8	89.4
		15 - 13 - 2	90.2	1243.0	86.5	1180.0	88.0	88.0
HUMIDITY RATIO	(LB/LB)	15 - 13 - 1	0.0162	1186.0	0.0157	1220.0	0.0160	
		15 - 13 - 2	0.0164	1192.0	0.0162	1242.0	0.0163	

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	674258.7	BTU/HR
STEADY-STATE HEAT SOURCES	40800.0	BTU/HR
HEAT SINK	-330029.1	BTU/HR

SUMMARY OF SIMULATION FROM 1170.00 TO 1260.00 SECONDS

(TUNNEL) 3700 FT TO EAST PORTAL AT 4000 FT FROM NODE 10 TO NODE 11

LENGTH 300.0 FT
AREA 700.0 SQ FT

		SYSTEM PARTITIONING	MAXIMUM VALUE	MAXIMUM TIME	MINIMUM VALUE	MINIMUM TIME	AVERAGE VALUE POSITIVE	AVERAGE VALUE NEGATIVE
AIR FLOW RATE	(CFM)	15 - 14	133468.	1188.0	-391831.	1242.0	33641.	-120232.
AIR VELOCITY	(FPM)	15 - 14	191.	1188.0	-560.	1242.0	48.	-172.
AIR FLOW DIRECTION	(PERCENT)	15 - 14					42.9	57.1
DRY-BULB TEMPERATURE	(DEG F)	15 - 14 - 1	87.6	1241.0	84.8	1180.0	85.8	86.1
		15 - 14 - 2	85.8	1239.0	83.0	1180.0	83.9	84.1
HUMIDITY RATIO	(LB/LB)	15 - 14 - 1	0.0165	1193.0	0.0164	1241.0	0.0164	
		15 - 14 - 2	0.0165	1195.0	0.0165	1240.0	0.0165	

AVERAGE SENSIBLE HEAT GAINS WITHIN THE SEGMENT

HEAT RELEASE FROM TRAINS AND UNSTEADY HEAT SOURCES	470771.1	BTU/HR
STEADY-STATE HEAT SOURCES	30600.0	BTU/HR
HEAT SINK	-130541.5	BTU/HR

END OF SIMULATION

APPENDIX D

REPORT OF NEW TECHNOLOGY

After a diligent review of the work performed under this contract, no new innovation, discovery, improvement or invention was made.

During the course of this contract, computer software and companion user documentation were modified and revised to support recurring applications of SES technology. Each application has served to enhance the range of techniques, analyses, and methodologies available for subway environmental design. By presenting a detailed, chronological account of all software maintenance, this volume describes for the first time, and in one consolidated volume, an advancing state-of-the-art which is essential to all users of the SES Computer Program.

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Software maintenance of
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